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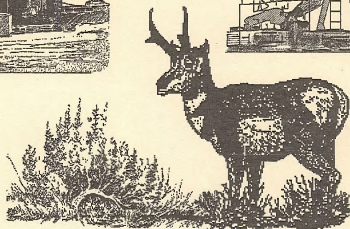
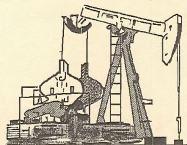
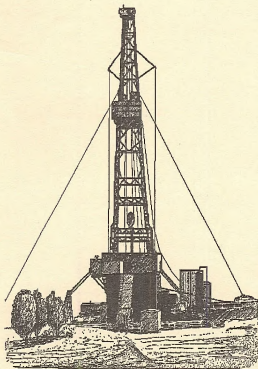
United States Department of the Interior
Bureau of Land Management

Colorado State Office

January 1991

COLORADO OIL AND GAS LEASING AND DEVELOPMENT

FINAL ENVIRONMENTAL IMPACT STATEMENT



Any person who participated in the plan amendment process and has an interest which is or may be adversely affected may protest approval of the proposed plan amendments. Protests must be filed in accordance with the planning regulations, 43 CFR 1610.5-2. These regulations require that protests be in writing and sent to the Director (760), Bureau of Land Management, Room 909, Premier Bldg., 1725 I Street, NW, Washington, D.C. 20240. Protests must be postmarked within 30 days of the date the Environmental Protection Agency published the notice of receipt of the final EIS in the *Federal Register*.

A protest shall include the following information:

- The name, mailing address, telephone number, and interest of the person filing the protest.
- A statement of the issue or issues being protested.
- A statement of the part or parts of the plan amendments being protested.
- A copy of all documents addressing the issue or issues that were submitted during the planning process by the protesting party, or an indication of the date the issue or issues were discussed for the record.
- A concise statement explaining why the proposed decision is believed to be wrong.

At the end of the 30-day protest period and after the Governor's consistency review, the proposed amendment, excluding any portions under protest, will become final. Approval will be withheld on any portion of the proposed amendment under protest until final action has been completed on such protest.

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
COLORADO STATE OFFICE
2850 YOUNGFIELD STREET
LAKEWOOD, COLORADO 80215-7076



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1991

Dear Reader,

Enclosed is the final environmental impact statement (EIS) and proposed resource management plan (RMP) amendment for the Glenwood Springs, Kremmling, and Little Snake Resource Areas, and the Northeast and San Juan/San Miguel Planning Areas. The proposed plan amendments are a refinement of the proposed action presented in the draft RMP amendment and EIS published in 1990.

We have attempted to be responsive to all comments. Many of the comments contributed significantly to the proposed action which we believe represents a balanced approach to management of all resource values. To our knowledge, this is the first time that BLM has combined amendments to five RMPs in one EIS. This has presented BLM with a unique challenge, which I believe we have met admirably.

Following completion of a Governor's consistency review and a protest period, individual records of decision and amendments for each of the five RMPs will be issued. This will not occur before May 1991. Please indicate on the enclosed card which plan amendments you would like to review, or call the number shown on the document title page.

We appreciate the time and effort you have expended to be involved in this process. Your continued participation is essential if we are to achieve wise management of our public lands and resources.

Sincerely,

H. Robert Moore
State Director

Enclosures (2)

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COLORADO
OIL AND GAS LEASING AND DEVELOPMENT
ENVIRONMENTAL IMPACT STATEMENT

Draft ()

Final (X)

Lead Agency: Department of the Interior, Bureau of Land Management

Cooperating Agency: Department of Agriculture, Forest Service

Type of Action:

Administrative (X)

Legislative ()

This is the Final Environmental Impact Statement and Proposed Resource Management Plan Amendment for the Glenwood Springs, Kremmling, and Little Snake Resource Areas, and the Northeast and San Juan/San Miguel Planning Areas in the State of Colorado. This EIS contains amendments to the oil and gas leasing and development decisions contained in the Resource Management Plans for the five areas. It corrects errors made in the draft RMP amendment/EIS. It also makes changes to the draft RMP amendment/EIS Proposed Action based on public comment.

For further information:

Jim Rhett, Project Manager
Bureau of Land Management
Colorado State Office
Branch of Fluid Minerals
2850 Youngfield Street
Lakewood, CO 80215
Telephone: 303/239-3770

Protests due: March 4, 1991

302 239

Date Released: February 1, 1991

Distribution List: see attached

BLM LIBRARY
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DENVER FEDERAL OFFICE
P.O. BOX 2500
DENVER, CO 80225-0000

DISTRIBUTION LIST

The following agencies and interest groups were sent copies of the Draft and Final RMP/EIS.

Federal Agencies

Forest Service
Corps of Engineers
Air Force
Bureau of Reclamation
Bureau of Mines
Department of Energy
Environmental Protection Agency
Minerals Management Service
National Park Service
Department of the Interior
Geological Survey
Congressional Representatives

Colorado State Agencies

Colo. State Clearing House
Department of Natural Resources
State Land Board
Governors' Office
Colorado State University
University of Colorado

Local Governments

Colorado Counties, Inc.
Douglas Creek Soil Conservation District
White River Soil Conservation District
Northwest Colorado Council of Governments
Colo. River Water Conservation District
Assoc. Governments of NW Colorado
Routt County Planning

Other Organizations

Aspen Wilderness Workshop
Colo. River Woolgrowers
Colo. Timber Industry Assoc.
Nucla-San Miguel Basin Forum
Rocky Mtn. Conservation Fund
Colo. Wildlife Federation
Colo. Cattlemen's Assoc.
Friends of the Earth
Independent Petroleum Assoc. of Mountain States

National Wildlife Federation
Natural Resources Defense Council
Sierra Club
Trail Ridge Rock & Mineral Club
University of the Wilderness Club 20
Colorado Environmental Coalition
Colo. Native Plant Society
Environmental Defense Fund
Grand Canyon Trust
Nature Conservancy
Rocky Mountain Oil & Gas Assoc.
Routt-Moffat Woolgrowers
Uintah Mountain Club
Western Colorado Congress
Wilderness Society
American Wilderness Alliance
Aspen Wilderness Workshop
Colo. Mountain Club
Colo. Chapter of Wildlife Society

Numerous companies and individuals expressing interest were sent copies of both the draft and final RMP/EIS.

SUMMARY

This is a proposed Resource Management Plan (RMP) amendment and final Environmental Impact Statement (EIS) for five resource management planning areas within the state of Colorado. These areas contain a total of 5.1 million acres of federal mineral estate that could be leased for oil and gas production. The five areas analyzed are the Glenwood Springs, Kremmling, Little Snake, Northeast, and San Juan/San Miguel. The RMPs are being amended to conform to the latest program guidance of the BLM. This program guidance requires the BLM to estimate oil and gas development potential and to base the leasing strategy on this potential. A reasonably foreseeable development (RFD) scenario is also developed for analysis and impact assessment.

The Proposed Action has categorized lands for leasing as follows:

Open Subject to Standard Terms and Conditions	2,168,000 acres
Open Subject to Seasonal or Other Minor Constraints	3,622,000 acres
Open Subject to No Surface Occupancy or Major Constraints	482,000 acres
Closed to Leasing	302,000 acres

*Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown for each area.

Both nondiscretionary closures (areas closed by law or regulation) and discretionary closures (areas closed by decision of the responsible BLM official) are described. The areas that are closed to leasing are usually Wilderness Study Areas (WSAs), town sites, military facilities, reservoirs, etc.

If the Proposed Action is approved, the five RMPs will be amended and the lands leased for oil and gas production as described above. The Proposed Action was analyzed along with two alternatives which are the Continuation of Present Management (No Action) and the Standard Terms and Conditions.

Major issues that were expressed during the public scoping period were the protection of

WSAs, Areas of Critical Environmental Concern (ACECs), cultural sites, major highway viewsheds, and sensitive areas. Identification of BLM's road network management policy was to be analyzed and also road construction standards.

Cumulative impact assessment is also a requirement of the new guidance. The cumulative impacts of the Proposed Action appear to be insignificant. Wildlife is the resource most subject to impacts but these were determined to be insignificant. The necessity of constraints on oil and gas development is discussed with rationale.

Oil and gas leasing under the Proposed Action will use the standard terms and conditions to the fullest extent allowable under the regulations to protect the existing resources. As an example, the lease allows the BLM to move an operation up to 200 meters and delay operations for up to 60 days. The use of lease stipulations for such items as the protection of wildlife during the winter will not be used if the winter period is less than 60 days. Also, the need to move a field operation to protect an isolated resource will not require the use of a lease stipulation if 200 meter relocation is sufficient to prevent the impact. Lease Notices will be used to alert the lessee of possible constraints depending upon his proposed operation and time frames.

Lease stipulations are used when the BLM knows that certain limitations, in addition to standard terms and conditions, are needed to protect other resource values. The BLM states under what situations (exception, modification, or waiver) the lessee may be released from the constraints of the lease stipulations. This provides the local manager flexibility in dealing with such variables as winter weather, shifting big game herds, new information, or inventories on sensitive resources, etc.

Conditions of Approval (COAs) are attached to permits to require the lessee to perform specific actions in a certain manner. COAs are dependent on the actual time frame and proposed operations on the ground.

The Continuation of Present Management (No Action) Alternative analyzes the impact of the way BLM is doing business today.

The Standard Terms and Conditions Alternative would be the minimum that the BLM could legally implement. Leases would not have stipulations but COAs would be imposed on individual permits to protect such resources as big game winter ranges, steep slopes, fragile soils, etc. Resources not already protected by federal laws would be protected by COAs, or in the case of ACECs, no leases would be issued.

The public review period began May 14, 1990, and ended on August 17, 1990. Three public meetings were held to receive oral comments. They were as follows: July 2, 1990, in Grand Junction, July 9 in Denver, and July 16 in Durango. Comments were received from a total of 130 individuals and agencies. The BLM has responded to over 300 comments in the Final EIS. Major areas of concern are the lack of a wider spread of alternatives and the lack of an alternative that proposes no leasing over the entire Study Area. There is concern that the BLM will not enforce the lease stipulations or will exempt the lessee from adherence. The lack of numerous, large, foldout maps was the concern of both industry and the environmental groups. Some disagreed with the impacts to wildlife and also the cumulative impact section.

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CHAPTER ONE

PURPOSE AND NEED



CHAPTER ONE

PURPOSE AND NEED

INTRODUCTION

This chapter describes why the Bureau of Land Management (BLM) is preparing this Environmental Impact Statement (EIS) and amending the oil and gas leasing decisions in five Resource Management Plans (RMPs). It further describes the purpose and need for leasing federal mineral estate for oil and gas development, locations within Colorado included in this EIS, relationships with other plans and programs, the planning process to be used in reaching leasing decisions, and the issues that have been raised with this Proposed Action.

PURPOSE AND NEED

The BLM, as agent for the Secretary of the Interior, has responsibility for leasing and managing the oil and gas resource where the mineral estate is federally owned. This is referred to as the federal mineral estate. For many years, concern has been expressed that BLM's oil and gas leasing process may not adequately comply with the National Environmental Policy Act (NEPA) requirements to analyze and disclose the cumulative impacts of oil and gas activities. During the last few years, conflicting court decisions have resulted in uncertainty. To resolve this issue, BLM officials consulted with representatives of environmental groups and the oil and gas industry to help revise BLM's environmental analysis standards for oil and gas leasing decisions which are made in the Resource Management Plan (RMP). This resulted in issuance of a new BLM manual guidance during the fall of 1987 titled, *Supplemental Program Guidance for Fluid Minerals*. At the time this guidance was issued, BLM within Colorado had six RMPs near completion or completed. To achieve compliance with the new standards in a reasonable time frame, it was decided to amend five of the RMPs in this document. The Piceance Basin RMP will be amended separately.

The five RMP/EIS's addressed in this EIS are: Glenwood Springs, Kremmling, Little Snake, Northeast, and San Juan/San Miguel. See Table 1-1. The RMPs encompass over five million acres of federal mineral estate, most of which underlies federal lands administered by the BLM. The leasing decisions described in the RMP/EIS's will be revised to conform to current policies and conditions. The most significant change is to incorporate, in a more systematic manner, a cumulative impact analysis which is based on a reasonable foreseeable estimate of future oil and gas activity. This requirement is described in BLM Manual section 1624.2.

This EIS examines the existing oil and gas leasing decisions made in the five RMPs in light of the potential for development and the reasonably foreseeable development described in Appendix B, and summarized in Chapter 2. The existing management decisions are analyzed for site-specific and cumulative impacts. Where this new analysis determines higher or lower impacts, increased or reduced mitigation is considered for inclusion in the Proposed Action.

For more than 100 years, it has been federal policy to make lands available for mineral exploration and development. The Arab oil embargo of the early 1970s emphasized the desirability of reducing U.S. dependence on imported oil. Although the federal mineral estate, known reserves, and existing production of oil and gas within the areas depicted in this EIS represent only a small proportion of the U.S. total production, reserves, and owned mineral estate, it is

TABLE 1-1. RESOURCE MANAGEMENT PLANS/ENVIRONMENTAL IMPACT STATEMENTS (RMP/EIS)

Resource Area	Date of Approval
Glenwood Springs	January 3, 1984
Kremmling	December 19, 1984
Little Snake	April 26, 1989
Northeast	September 16, 1986
San Juan/San Miguel	September 5, 1985

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nonetheless important. This is especially true to Colorado. Development of the oil and gas resource has historically been an integral part of the state and local economies in Colorado. Although the rate of development has declined in recent years, it is expected to continue to be an important economic factor, affecting state and local communities and the Rocky Mountain Region.

LOCATION

The Study Area includes all public lands and mineral estate within the Glenwood Springs Resource Area (GSRA); Kremmling Resource Area (KRA); Little Snake Resource Area (LSRA); Northeast Resource Area and a portion of the Royal Gorge Resource Area (referred to as the Northeast Planning Area (NPA)); and San Juan Resource Area and a portion of the Uncompahgre Basin Resource Area (referred to as the San Juan/San Miguel Planning Area (SJ/SMPA)). See Map 1-1.

The Study Area encompasses over 3.2 million acres of BLM-administered surface lands and over 5 million acres of federal oil and gas mineral estate. See Table 1-2.

The map scale used in this plan is chosen to facilitate public recognition of general resource localities. The cost to print maps at a different scale which would allow for greater detail in identifying resource and stipulation location is prohibitive when two factors are considered. First, maps used for locating resources are dynamic; continuing inventories and new information result in constant changes. The greater graphic specificity and detailed information which is possible by using a larger scale map is valid for only a short time after the maps are printed. Second, the maps in this document are for the purpose of helping the reader, that is, the decision maker and the interested public, understand the nature of the proposed action and the alternatives. The map scale

chosen achieves this purpose by graphically providing a general sense of the location of the resources in question. No greater scale is needed to understand generally for each resource/planning area the spatial relationships between the oil and gas resources and the various types of stipulations considered.

Each Resource Area Office has the detailed, larger scale working maps and/or files that are used for management and inventory purposes. Anyone requiring information about specific localities, or areas too small to be clearly defined on the plan amendment maps, or large areas whose boundaries may be indistinct at this scale, should contact the appropriate Resource Area Office. An additional reason for contacting the Resource Area Office is to check on the latest status of some boundaries. The protective measures discussed in this plan would be applied as required by the plan decisions, and as new inventories show the expansion or contraction of some resources, for example, elk crucial winter habitat, the area of applicability will change. Information about the specific applicability of lease stipulations to individual parcels of land is also available in the Colorado State Office, at least in a text format.

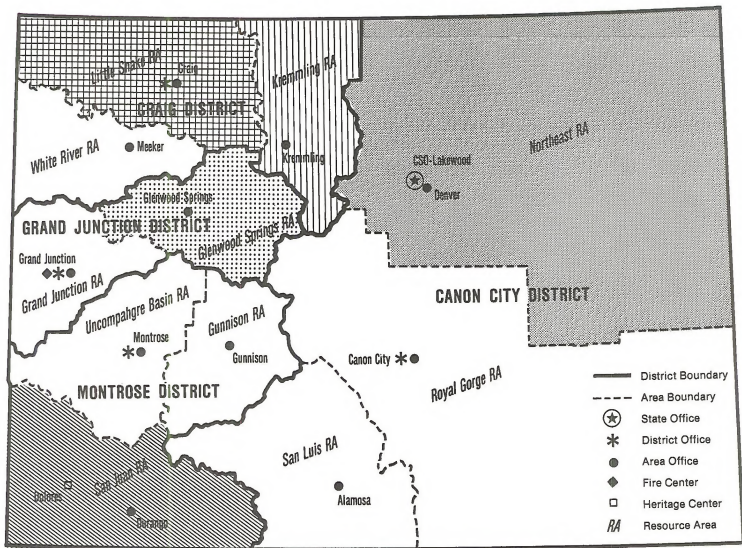
RELATIONSHIP TO BLM POLICIES, PLANS, AND PROGRAMS

The decisions as to which lands will be leased and how they will be leased for oil and gas development are being made through a plan amendment process. This involves the following nine steps: 1) Issue identification. This step was initiated by public notices and included open houses requesting public input to help focus the process on those issues of concern related to BLM's management of oil and gas development. 2) Planning Criteria. Based on the issues identified, appropriate parameters and the scope of the analysis were determined. 3) Inventory. Data necessary to make informed decisions was collected. 4) Management Situation Analysis. The existing situation was described and an analysis prepared

TABLE 1-2. STUDY AREA

	Surface acres	Total Federal Mineral Estate(1)
Glenwood Springs Resource Area	516,000	725,000
Kremmling Resource Area	386,000	651,000
Little Snake Resource Area	1,317,000	1,878,000
Northeast Planning Area	32,000	600,000
San Juan/San Miguel Planning Area	994,000	1,291,000
TOTALS	3,245,000	5,145,000

(1) Includes surface acres.



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to identify management opportunities and limitations. 5) Alternative Formulation. Each alternative analyzed was a complete and implementable set of decisions providing different responses to the issues. 6) Estimation of Effects. The environmental impacts of each alternative are described and possible mitigation measures are identified. 7) Select Alternative. The product of this step was a proposed plan amendment and draft EIS which BLM provided for public review and comment. 8) Select Plan Amendment. Using the public comments received, the State Director selected the amendment disclosed in this document, which is then subject to a 60-day Governor's consistency review, and a 30-day protest period. 9) Monitoring and Evaluation. Implementation of the leasing decisions is tracked and their effectiveness is periodically monitored to determine if changes are needed.

The 1920 Mineral Leasing Act, as amended, authorizes the Secretary of the Interior to lease oil and gas resources on all public domain and acquired lands. Lands excluded from such leasing by legislation or secretarial policy are listed in the Code of Federal Regulations (CFR) title 43, part 3100.0-3. The excluded lands include units of the National Park System; Indian reservations; Naval Oil Shale Reserve; incorporated cities, towns, and villages; and lands recommended for wilderness designation, wilderness study area (WSA) and lands within the national Wilderness Preservation System.

The WSAs included in this EIS are generally protected by a No Leasing stipulation. Some portions of the WSAs were leased prior to the WSA designation. The pre-WSA leases are still valid and may be developed under the BLM's Interim Management Guidelines. Congress will make a determination on the final designation of the WSAs. If Congress decides not to designate an area as wilderness, it will be managed under guidelines published by BLM in the respective Final Wilderness EIS and Record of Decision for each Resource Area.

Because this amendment involves five separate RMPs which were approved over a five-year period, there are some differences in how this amendment relates to these existing land use plans. In 1982, a series of

Environmental Assessments (EAs) were prepared by BLM which addressed oil and gas leasing on public lands throughout Colorado. These EAs documented leasing decisions for virtually every tract of public land and eliminated the need for reviews at field offices of each proposed lease. This documentation was prepared by each Resource Area Office and provided to the Colorado State Office where leases are issued. The Glenwood Springs and Kremmling RMPs updated these existing EAs, which were retained to provide direction for leasing. The San Juan/San Miguel and the Northeast RMPs revisited all leasing decisions and replaced these earlier EAs. In the case of the Northeast RMP, much of what was pertinent from the 1982 EA was updated and included in what was termed a "Technical Report" to the RMP. For the Little Snake RMP, BLM initially intended to use this same process; however, before this RMP was approved, the new standards, described earlier, necessitated that the RMP be amended. Oil and gas leasing decisions in the current RMPs have been compared to the reasonably foreseeable development (RFD) scenarios in this EIS and new decisions have been formulated. These new decisions amend the existing RMPs, and replace all earlier planning and environmental documents which serve as a basis for leasing decisions.

RELATIONSHIP TO NON-BLM POLICIES, PLANS, AND PROGRAMS

This plan will not make decisions for mineral resources not administered by BLM within the Study Areas. Leasing decisions for federal minerals not administered by the BLM will be made by the appropriate agency in cooperation with the BLM.

To reduce or avoid conflicts between administrative agencies, the planning documents for adjoining lands have been reviewed, and where appropriate, that information has been used in developing the Proposed Action analyzed in this EIS.

Lands administered by the Department of Agriculture, U.S. Forest Service (USFS) will have leasing decisions made in a USFS Land and Resource Management Plan/EIS. The BLM is a cooperating agency providing

PURPOSE AND NEED

oil and gas expertise to the USFS EIS Team preparing these plans. BLM provides the USFS with projections of future oil and gas activity and impact analyses of subsurface construction.

The USFS plans analyze impacts from oil and gas leasing and development to National Forest System Lands and describe where the USFS will or will not consent to lease. The BLM plan for a Resource Area will look at the cumulative impacts of the Proposed Action on all lands within that Resource Area, but the specific impacts of leasing and development on National Forest Lands will be analyzed in the USFS plan.

The BLM is responsible for the leasing and development of lands administered by the National Park Service that are eligible for that purpose. However, all National Parks and Monuments are withdrawn by law, and National Recreation Areas are withdrawn by regulation from mineral leasing. This EIS will not analyze leasing of these lands, but will analyze impacts to these lands from leasing adjacent federal mineral estate. For that reason, the BLM consulted the National Park Service in preparation of this plan amendment.

The BLM is coordinating with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act. The USFWS has determined that consultation is not required for any listed species other than fish. The current plan is for the BLM and the USFWS to enter into consultation to determine the effect of water consumption on listed fish species. The BLM has identified the amount of water consumption for the Proposed Action. Mitigation will be in the form of payments to the USFWS to purchase water rights.

The BLM has a memorandum of understanding with the Colorado Oil and Gas Conservation Commission (COGCC) and a long standing, day-to-day working relationship between the COGCC staff and the BLM mineral resource staff. The working relationship consists of staff level communications related to technical requirements for drilling wells in Colorado. This includes spacing of wells, draining oil and gas reservoirs, analysis and mitigation of impacts to groundwater, and other mineral resources (non-oil and gas). The relationship

of the BLM and COGCC is based on the COGCC's authority over oil and gas operations in the state of Colorado.

The BLM relationships with county governments in Colorado are based on memoranda of understanding with the local counties and/or with Colorado Counties Incorporated. These memoranda contain such details as what BLM-administered actions the county should be notified of, and when the notification should take place. Necessary county/BLM coordination and joint action may also be defined. Copies of these county/BLM agreements are on file for public review in the appropriate Resource Area Office.

The BLM has a cooperative agreement with the Colorado Division of Wildlife (CDOW) concerning wildlife management. Under this agreement, the BLM and CDOW cooperate on numerous actions that affect wildlife habitat and populations. The CDOW has been consulted throughout the regular RMP process in each of the five resource areas and also during development of this EIS and RMP amendment.

The BLM leases federal minerals that lie beneath private surface (split estate). The private landowner is notified when the minerals are leased and when an Application for Permit to Drill (APD) is filed. The landowner is invited to attend the on-site inspection and his needs and desires are considered when the decision is made to approve the APD. The needs of the landowner are also considered if and when a plan of development is reviewed so that field development considers the private surface and the resources. The BLM has the authority to require the same mitigation on the private surface as it does on federal lands. This ensures the private landowner of protection when the underlying federal minerals are extracted.

EXISTING RIGHTS

Oil and gas leases issued by the BLM at the direction of Congress (1920 Mineral Leasing Act as amended) are contractual agreements between the U.S. and the lessee. New management practices and techniques are incorporated in existing lease management so long as they are compatible with the lease rights granted. The lease rights granted

CHAPTER ONE

consist of the right to occupy as much of the lease surface as is reasonable for the extraction of the resource and the right to remove the resource (oil and/or gas). When these two rights must be restricted, a stipulation is written and becomes part of the lease. One example of such a restriction is the denial of the surface for a specified period of time (for a discussion of Timing Limitation Stipulations, see Appendix E). The standard lease terms allow the Authorized Officer to require reasonable measures to mitigate adverse impacts from proposed operations. For example, the Authorized Officer may deny use of the surface for up to 60 days. This plan amendment will not amend valid existing rights. New management practices, identified in the Proposed Action, that do not violate existing rights will be used in managing existing leases in the form of Conditions of Approval (Appendices D and F).

AUTHORIZING ACTIONS

To lease federal oil and gas, a decision must be reached by the BLM as to which lands to lease and whether stipulations are necessary for the protection of the environment and other resources. If a decision is reached to lease under one of the alternatives in this EIS, additional actions will be required before on-ground operations begin. These actions begin when a lessee submits an Application for Permit to Drill (APD). APDs are posted in the public rooms of the local BLM offices and in the public room of the BLM Colorado State Office in Denver. If the action is on U.S. Forest Service lands, the APDs are also posted in the appropriate Forest Service office.

When applications are received, an on-the-ground (on-site) inspection is scheduled and the appropriate agencies are invited to attend. The county government, Colorado Division of Wildlife, and the surface owner or manager are notified of the Proposed Action. The lessee shows the group where each facility will be constructed and appropriate changes or modifications are made on the spot. Information is gathered by the BLM for an environmental assessment (EA) that will be written. For each action, conformance with the RMP and compliance with NEPA is certified. Lease operations must conform with the decisions in the RMP. The EA is tiered from this EIS. If any

impacts to threatened or endangered species are identified during the EA process, the USFWS will be contacted and appropriate review and consultation will begin. If any impacts or decisions need to be added to the existing RMP, an analysis will be conducted to determine if a plan amendment is necessary. When the number of wells identified in the RFD for a resource/planning area have been authorized, an environmental analysis will be completed to determine if the impacts identified in this EIS have been reached or exceeded. This analysis will determine if new leasing decisions are necessary. Prior to the APD approval, a clearance for cultural and paleontological resources, and threatened and endangered species must be completed. These clearances are to be performed by approved individuals with the appropriate qualifications.

When the EA has been completed and the necessary clearances are received and verified, the APD is approved and issued. Then actual construction can begin. The same process is used if the lessee submits a Sundry Notice or Right-of-Way (ROW) application. Sundry Notices are used to apply for activities other than the drilling of a well, i.e., repair, fracturing, repairing casing, etc. ROWs are used to authorize wells, roads, pipelines, and production facilities on public lands outside oil and gas lease boundaries.

Geophysical exploration (seismograph activities) on public lands is reviewed and authorized through a Notice of Intent submitted by the operator.

EIS SCOPING PROCESS AND ISSUES

The BLM announced their intent to prepare an EIS and solicited comments from the public. The announcement appeared in the *Federal Register* on March 13, 1989, and in local news media.

Public meetings were held during the 30-day comment period in Walden, Craig, Glenwood Springs, Durango, and Denver. Meetings were also held with Colorado Department of Natural Resources agencies and several environmental groups and industry representatives. Ten letters were received during the scoping process. The issues and concerns that were expressed are

PURPOSE AND NEED

summarized below. Scoping documents, containing more detail, are on file in each of the five BLM Resource Area Offices participating in preparation of this EIS.

Scoping issues that will be discussed are categorized and shown below.

- Identify impacts on water, visual resources, threatened and endangered species
- Consider buffer zones around sensitive areas
- Identify procedures in the leasing and development of oil and gas
- Analyze rehabilitation program
- Analyze road construction standards
- Discuss road closure policy
- Trace off-site impacts
- Trace impacts to the point of insignificance
- Coordinate planning with neighboring agencies
- Analyze compliance and monitoring programs
- Identify and analyze any hazardous waste issues
- Consider certain areas for No Leasing--
This list is available in each Resource Area Office.



CHAPTER TWO

ALTERNATIVES

CHAPTER TWO

ALTERNATIVES

INTRODUCTION

Three alternatives have been developed to address issues where oil and gas development may be a concern. Using an assessment of the potential of development (POD), the three alternatives, which differ in terms of mitigative requirements, are analyzed to determine the reasonably foreseeable development (RFD) of the oil and gas resource within the Study Area. In turn, the RFD is used to assess impacts expected to occur with each alternative.

The regulations of the Council on Environmental Quality at section 1502.14, Title 40, of the Code of Federal Regulations, require that an Environmental Impact Statement (EIS) "rigorously explore and objectively evaluate all reasonable alternatives. . . ." The BLM believes the three alternatives presented provide an adequate range of reasonable proposals and options to make a well informed choice.

The BLM has elected to eliminate from detailed study a Resource or Planning Areawide No Leasing alternative. The Mineral Leasing Act gives the Secretary of the Interior discretionary authority to issue oil and gas leases. A No Lease decision is made where it is determined that oil and gas leasing is not in the public's interest. However, the Secretary cannot be arbitrary and capricious in making such a decision. A No Lease decision is reached only after careful consideration of conflicting resource values and uses and environmental consequences.

It is the policy of the BLM that lands are generally available for oil and gas leasing where measures can be taken to mitigate conflicts and environmental consequences to an acceptable level. Given the nature and success of such mitigation, and the multiple use mandate of the Federal Land Policy and Management Act, a No Lease decision covering all lands in each of the entire Resource or Planning Areas included in this EIS would be arbitrary and capricious.

Therefore, a No Lease alternative is unreasonable. Rather, No Leasing was considered and analyzed on a more site-specific basis as a part of the analyzed alternatives. Where it was determined that even the most restrictive mitigation available, i.e., No Surface Occupancy, will not adequately mitigate conflicts or environmental consequences, so that leasing is not in the public's interest, a No Leasing decision is considered.

The reasonable alternatives considered in this EIS are as follows:

- The Proposed Action Alternative is to lease oil and gas with Standard Terms and Conditions, and additional leasing stipulations to further protect resources and values beyond the level of protection in the Standard Terms and Conditions. These additional stipulations will be derived from the existing stipulations (those contained in the Continuation of Present Management Alternative) and ones newly developed during this plan amendment. This alternative contains the management prescriptions that local managers believe to be the best balance of past practices, and new prescriptions developed from public and internal suggestions during the scoping for this plan.

- The Continuation of Present Management Alternative would lease oil and gas resources with Standard Terms and Conditions, and the stipulations currently in use (Appendix C shows the standard terms and conditions and Appendix G lists necessary stipulations in current use). The purpose of analyzing this alternative is to determine if any changes are needed in the present management decisions, and to predict what will occur over the next 20 years in oil and gas development if there were no changes in current management.

- The Standard Terms and Conditions Alternative consists of leasing for oil and gas with only the standard terms and conditions. The Standard Terms and

CHAPTER TWO

Conditions are required by law and regulation and are attached to every oil and gas lease regardless of other considerations (Appendix C). This is the most simplistic alternative that can be reasonably analyzed. This alternative is potentially the least restrictive leasing program the BLM would be permitted by law to implement.

Appendix A gives a detailed description of oil and gas operations from preliminary exploration, through drilling of individual wells and development of a field, to final abandonment of the wells. An understanding of oil field operations and the BLM management practices required in oil and gas production is critical to the analysis of environmental impacts.

In addition to this EIS, an environmental assessment (EA) will be completed on each Application for Permit to Drill (APD) or group of APDs. If the analysis in the EA determines that the lease stipulations are not required to prevent impacts, the EA will determine the applicability of exceptions and will document and recommend the use of exceptions. Alternative mitigation may be developed and added to the APD in the form of COAs. Conformance to this EIS will also be determined in the EA.

THE POTENTIAL OF DEVELOPMENT (POD) FOR OIL AND GAS RESOURCES

Assumptions for the POD of oil and gas resources in the Study Area over the next 20 years (beginning with 1989) are outlined in Appendix B. These assumptions are necessary for a meaningful and reasoned analysis of the cumulative impacts resulting from oil and gas leasing and development. The assumptions are based on statistical analysis of historical development. The projected number of wells have been increased in some cases to account for increased activity and new interest in coal bed methane that was

not reflected in historical trends. This increase will also allow a safety factor in forecasts of activities and impact assessment.

Table 2-1 shows the numbers of wells projected for each Resource/Planning Area by potential development region. All potential development regions are not present in all Planning or Resource Areas (e.g., Region 1 for Northeast and San Juan/San Miguel Planning Areas). Potential development regions are shown in Appendix B.

Region 1--No potential for oil and gas development: Absence of source rock, thermal maturation, or reservoir rock prohibiting oil and/or gas occurrence.

Region 2--Low potential for oil and gas development: Specific indications that one or more of the following are not present: source rock, thermal maturation, or reservoir strata possessing permeability and/or porosity, and traps.

Region 3--Moderate potential for oil and gas development: Geophysical or geological indication that the following are present: source rock, thermal maturation, reservoir strata possessing permeability and/or porosity, and traps.

Region 4--High potential for oil and gas development: Contains oil and gas source rock, thermal maturation, reservoir strata possessing permeability and/or porosity, and traps or part of an oil and gas play as defined by the U. S. Geological Survey (Open File Report 88-373 or related publication).

TABLE 2-1. PROJECTED NUMBER OF WELLS

	GSRA	KRA	LSRA	NPA	SJ/SMPA
Wildcat Wells					
Region 1	0	0	1	NA	NA
Region 2	2	8	1	1	5
Region 3	4	2	8	10	40
Region 4	22	30	281	106	104
Subtotal	28	40	291	117	149
Development Wells					
Region 1	0	0	0	NA	NA
Region 2	4	14	0	1	8
Region 3	8	4	8	10	60
Region 4	50	50	251	110	136
Subtotal	62	68	259	121	204
TOTAL	90	108	550	238	353

NA--Not Applicable - This Potential Development Region is not present in this planning area.

TABLE 2-2. FIELDS

	GSRA	KRA	LSRA	NPA	SJ/SMPA
New Fields	4	6	12	0	17
Average Size ⁽¹⁾	4	3	7	NA	4
Wells Per Section	2	4	3	6	3

⁽¹⁾ Average Size in ideal Sections. A Section is equal to 640 acres, and is one mile square.

NA--Not Applicable - No fields projected.

The impacts of geophysical exploration, and oil and gas exploration and development have been analyzed for each resource listed. The cumulative impacts of these operations on any one resource are shown in Chapter 4. Analysis of the rate of development (the number of wells drilled in any given year) was made by the resource specialist based on the greatest expected impact to the resource. Therefore, this scenario was developed from the well numbers, location, etc., that are displayed in the POD (Appendix B) for each area.

Coal-bed methane development has been considered along with other oil and gas development for Glenwood Springs Resource Area (GSRA), Little Snake Resource Area (LSRA), and San Juan/San Miguel Planning Area (SJ/SMPA). At this time, no coal-bed methane development is anticipated for Kremmling Resource Area (KRA) and Northeast Planning Area (NPA).

GSRA and NPA increased the number of wells projected from that shown in the POD due to recent expanded activity. In GSRA, most of the recent activity is in coal-bed methane development.

Fields

Development may also be viewed in terms of the expected concentration of wells. The anticipated number of wells would not be distributed uniformly across the Study Area. Wells would be concentrated in "fields." Table 2-2 shows the anticipated concentration of new field development in each Resource/Planning Area.

It should be noted that in NPA, federal land comprises such a small proportion of overall anticipated development that it is unlikely a new field would involve any BLM-administered surface or more than five to 30 percent of the mineral estate. New field development in the NPA would be primarily in the jurisdiction of the state of Colorado.

ALTERNATIVES

Mitigative Measures Common to All Alternatives

BLM lease form 3100-11, Offer to Lease and Lease for Oil and Gas, contains lease terms and conditions. The terms cover such items as bonding, rental and/or royalty, inspections, safety, and protection of other resources. Specifically, Section 6 of the lease terms establishes general requirements for conducting operations on the lease and is referred to as the "Standard" lease term for protection of surface resources. This section, in conjunction with the regulations in 43 CFR 3100 and applicable Notices to Lessees and Oil and Gas Onshore Orders, provides latitude for modification of siting (i.e., relocation of the proposed well up to 200 meters), facility design, timing of operation (i.e., no operations up to 60 days), and requirements for interim and final reclamation measures. The standard lease term specifically requires that prior to conducting any surface-disturbing activities, the lessee/operator will contact and receive approval from the BLM, and the lessee may be required to complete minor inventories and/or short-term special studies.

It is not possible to anticipate the entire spectrum of activities which could be proposed; therefore, other practices not identified in specific mitigation could be applied in particular situations. In addition, new advances in technology and reclamation practices are continually being developed. These advances could result in providing the needed resource protection through means other than those identified in this plan. The BLM will take whatever action it deems necessary for the protection of other resources so long as such protection is reasonable and does not infringe upon the rights granted to the lessee. Reasonableness is defined by the relative importance of the resources in question and the propriety of the mitigation required. Reasonableness is determined in each case on its merits and in

CHAPTER TWO

accordance with the decisions from this plan and the Resource Area RMP/EIS. The rights granted to the lessee are only those necessary for the extraction of the oil and/or gas resource.

Restrictions applied to field operations by federal regulation, based on applicable laws and Section 6 of the lease instrument (See Appendix C), are found in the Code of Federal Regulations (CFR), Part 43 sub-part 3100. These regulations give the Authorized Officer authority to determine how field operations are conducted. Since federal regulation makes these requirements mandatory, they are not repeated in the leasing stipulations. Some requirements may be noted in lease notices for special emphasis. Leasing stipulations developed in this EIS are not applicable to existing leases. Analysis of impacts have taken these existing leases into account.

The various resources and values within each Resource/Planning Area are inventoried (inventory is an ongoing, almost continuous effort) and analyzed to determine what impacts oil and gas development may have. Impacts are viewed both in terms of positive and negative impacts, both to and from oil and gas development. Once impacts are identified, analysis is made to determine what (if any) mitigative or protective measures might be applied to prevent or reduce those negative impacts. The mitigative and/or protective measures must then be transformed into the necessary legal language to be effectively applied to field operations. Mitigation is accomplished by requiring an oil and gas lessee to do (or not do) certain things, such as building roads in such a way as to decrease soil erosion. This mitigation is accomplished by appending the requirement to the operational field application (such as an Application for Permit to Drill). In this plan, these requirements are referred to as Conditions of Approval (COAs). BLM's authority to impose these requirements is derived from specific legislation (1920 Mineral Leasing Act, as amended) and the resulting federal regulation. In some cases, the only way to adequately protect a resource/value from development impacts is to so severely restrict the operation as to deny the lessee some, or all, of the rights granted in the lease. In these cases, since a lease is a binding contract, it is necessary to stipulate the lease in such a way prior to the sale that

the government reserves additional rights over and above those normally reserved in a lease. The stipulations placed on the lease are then carried through the approval of the field operation as part of the lessee's plan of operations.

An example of this process in action might be that observation has shown elk gather, during severe winters, in protected areas that have forage available with minimum digging in the deep snow. Another study shows that elk generally avoid humans and human activity (operating machinery such as drill rigs, for example). Observation of past oil and gas field development may have also shown that when a well is drilled in one of these areas, during a severe winter, the elk are effectively denied that part of the crucial winter range. The impacts of displacing these animals may be: 1) direct--some animals die of starvation or stress induced by the deep-snow migration to another protected area; 2) indirect--animals in adjacent crucial winter range may starve due to the increased feeding pressure from the displaced herd, or the displaced herd may impact other environments, such as a rancher's winter pasture; or 3) cumulative--several drilling operations or a combination of drilling and other (non-oil and gas) operations will displace several groups from their crucial winter range resulting in an even more severe impact to the overall herd or other resources (vegetation, livestock, etc.).

Mitigative measures discussed in this section would be applied to oil and gas exploration and development activities under all of the three alternatives. These mitigative measures, referred to as COAs, are used to mitigate impacts to the environment, public health, and safety. The Authorized Officer would choose among these measures to mitigate environmental impacts identified on a site-specific basis at the field development stage. Authority to apply COAs stems from and must be consistent with the lease rights granted. BLM may not give a lease holder the right to extract minerals, and then at the time of development, require mitigation not specified in the lease that would disallow part, or all of the mineral extraction. Reasonable measures under lease rights are defined in CFR 3101.1-2 as allowing the movement of a proposed well up to 200 meters and restriction of timing of the operation by as much as 60 days.

ALTERNATIVES

COAs are attached to all surface-disturbing activities. These would most commonly include Applications for Permit to Drill (APDs), Sundry Notices, applications for rights-of-way, and Notices of Intent (NOI) for geophysical operations. These COAs are used on a site-specific basis at the discretion of the Authorized Officer. COAs are applied to specific sites for the protection of resources that would otherwise be impacted by that operation. A given COA is always applied to protect a resource affected by the specific operation being approved even on existing leases. COAs common to all alternatives are listed in Appendix D.

Stipulations less restrictive than those chosen for the three alternatives were considered and determined to be insufficient to protect the resource. More restrictive stipulations were also considered, but found to be unnecessary for the protection of the resource. An example of these considerations are stipulations in the Proposed Action Alternative to protect wildlife habitat by timing limitations. The habitat could be protected by not leasing the area or by not allowing surface occupancy year round. These levels of restriction do not add to the protection afforded by the timing limitation. The timing limitation stipulation will protect the habitat from impacts associated with drilling, and construction of roads and pads during the season when it is in use by the wildlife. Less restrictive measures might include shorter closure periods, screening operations from view or hearing of the animals, and/or re-location (less than 200 meters) of operations from areas most used by the wildlife. These measures would not protect the habitat as well as the timing limitation.

Proposed Action Alternative

The Proposed Action was developed from analysis of the Continuation of Present Management and the Standard Terms and Condition Alternatives. It provides appropriate mitigative measures for protecting resource concerns and uses, while allowing oil and gas leasing and development with a minimum of restrictions.

Many impacts are adequately mitigated by COAs attached to field operation approvals and by stipulations attached to the lease. If an impact cannot be sufficiently mitigated

under the Standard Terms and Conditions, the stipulations used under present management were analyzed for effectiveness. If the existing lease stipulation was sufficient, it was carried forward in the Proposed Action. If the necessary stipulation was not found, or found to be inadequate, a new stipulation or COA was developed for the Proposed Action. Tables 2-6, 2-9, 2-12, and 2-15 show the availability of federal lands for leasing within the five Resource/Planning Areas under this alternative.

This Plan Amendment will make leasing decisions for all federal oil and gas mineral estate in the Planning Area that is subject to the Mineral Leasing Act with the exception of National Forest System lands. The Forest Service, in coordination with the BLM, will make leasing decisions for Forest Service lands in their Forest and Resource Management Plans. Many of these plans are presently being revised. The BLM plan amendment will analyze both specific and cumulative impacts of the Proposed Action on adjacent National Forest System lands. The analysis also considers specific and cumulative impacts on adjacent nonfederal lands (private, state) and federal lands exempt from the Mineral Leasing Act (e.g., National Park Service lands and Wilderness).

Reasonable Foreseeable Development

The restrictive measures imposed by the COAs and lease stipulations under the Proposed Action Alternative would increase the cost of lease operations (through additional cost of inventories, monitoring, more costly construction methods, use of directional drilling, etc.), but would not change overall development from that predicted in the POD (Appendix B). The projected number of wells to be drilled and the acres disturbed are the same under this alternative as in Table 2-1.

In the Proposed Action Alternative, some total acreage figures have increased from those shown in the Continuation of Present Management Alternative. The increase is due to the fact that some Resource Management Plan/Environmental Impact Statements (RMP/EIS) did not analyze some areas for leasing, preferring to give them "case-by-case" study if interest was shown in leasing. This was particularly true of split-estate lands (private surface/federal minerals). The

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Proposed Action Alternative analyzes all federal and split-estate lands within the Study Area except those discussed in Chapter 1.

Lease Stipulations

Stipulations may be attached to oil and gas leases issued under this alternative. New stipulations can not be attached to existing leases without the consent of the lessee; however, stipulations previously attached to those leases are retained as long as the lease is valid. The majority of federal leases issued in Colorado expire with no operation occurring. If the acreage involved in these expired leases is re-offered for sale, it will be with the new stipulations attached. The Proposed Action stipulations for each Planning Area are listed in Appendix E.

Appendix E represents the mitigation determined to be necessary to protect resource uses or values by modifying or limiting the standard rights granted to a lessee. With respect to the timing of operations, for example, necessary mitigation measures are closures for surface use and occupancy exceeding 60 consecutive days. Because such closures exceed the reasonable measures the Authorized Officer may take at the time operations are proposed (see section 6 of the lease form, Appendix C, and 43 CFR 3101.1-2), a stipulation is required to modify the lease rights. See Maps 2-1 to 2-15.

The lease grants the right to occupy the surface and the right to extract the resource (oil and/or gas). The "rights" constitute property rights and are entitled to the same benefits. The BLM may restrict even these rights, but it must be done by stipulation attached to the lease document prior to issuance. An example of a restriction to the lease rights would be a Timing Limitation or No Surface Occupancy stipulation (see the Introduction to Appendix E for a discussion of stipulations).

In some cases, the way in which the BLM would allow oil and gas development is so restrictive as to affect the lessee's right to occupy the surface. In these cases, a Controlled Surface Use stipulation is appended to the lease (see Appendix E for a discussion of the CSU stipulations). These stipulations allow for surface occupancy but only under very specific conditions.

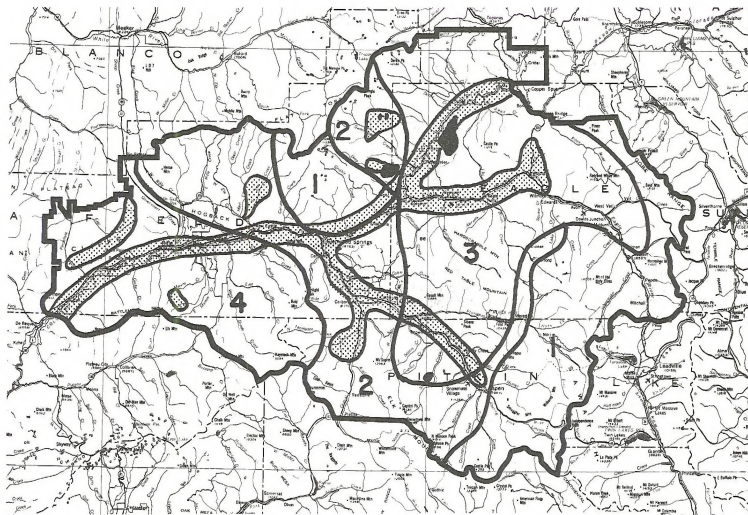
The standard lease form makes it clear that the lessee must comply with all laws (such as the Endangered Species Act) regardless of when the law was enacted and regardless of the effect it may have on the rights granted. The lessee must also comply with all regulations, Oil and Gas Onshore orders, lease terms, attached stipulations, etc., including those put into effect after the lease was issued so long as they do not conflict with the lease rights. An example of a regulation that would conflict with existing rights would be one which denied surface occupancy. However, if the lease had originally had a No Surface Occupancy stipulation attached, a new regulation denying surface use would not be in conflict with that lease.

Impacts from existing leases under the Proposed Action Alternative would be the same, or less, as those described for Present Management and Standard Terms and Conditions Alternatives. Leases issued prior to the respective Resource Management Plans would have impacts similar to those described in the Standard Terms and Conditions Alternative, except where stipulations are attached.




Conditions of Approval

The mitigative measures common to all alternatives (Appendix D), will be considered in determining well site locations and developing COAs to attach to NOIs, APDs, and associated rights-of-way before approval under the Proposed Action. These measures and the COAs shown in Appendix F will be applied by the Authorized Officer as appropriate on a case-by-case basis. Not all COAs would apply to every field operation. Only those needed in a particular case will be used. COAs could be modified or created to meet specific needs, but the protection level envisioned in these COAs would be maintained.

The COAs in Appendices D and F include timing limitations of 60 days or less. Such reasonable measures are enforced at the time operations are proposed under the authority of the regulations and lease terms (see section 6 of the lease form, Appendix C, and 43 CFR 3101.1-2). No lease stipulation is required to ensure mitigation where timing is limited by 60 days or less, or location is moved 200 meters or less. However, as a



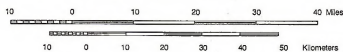
GLENWOOD SPRINGS RESOURCE AREA

-  Resource Area Boundary
-  No Leasing
-  No Surface Occupancy

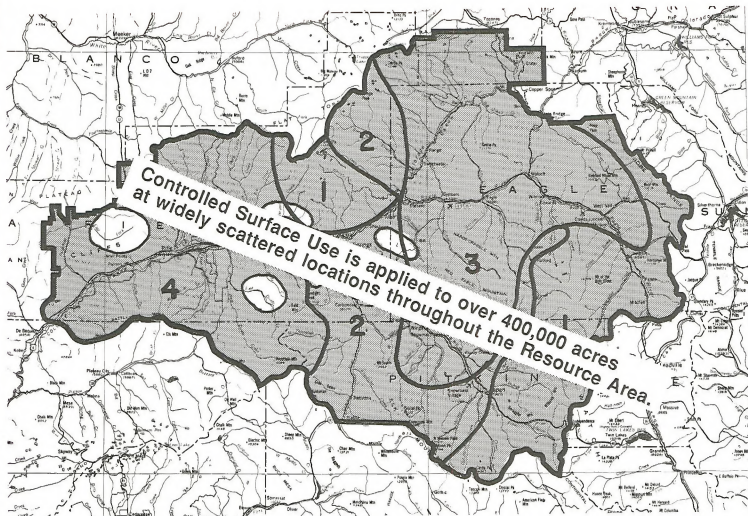
Oil and Gas Potential

- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High


Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map 2-1



GLENWOOD SPRINGS RESOURCE AREA

 Resource Area Boundary

 Timing Limitations

Oil and Gas Potential

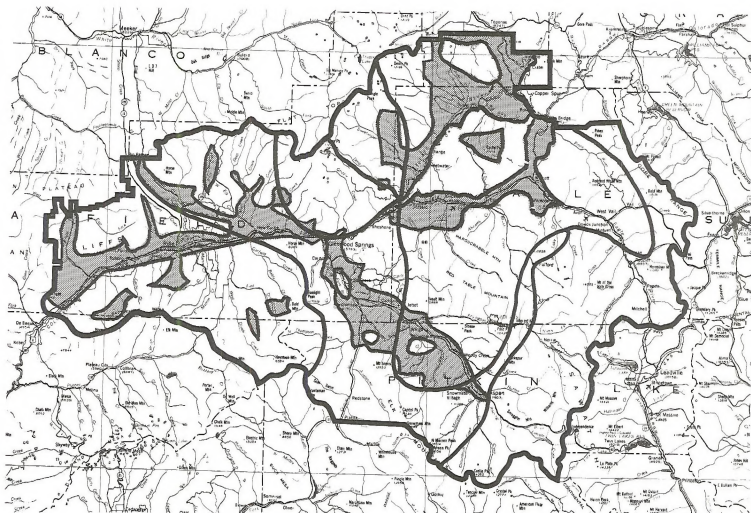
- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High

Scale 1:1,000,000
1 inch equals Approximately 16 miles

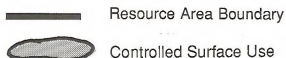


Map 2-2





GLENWOOD SPRINGS RESOURCE AREA



All perennial streams are covered by CSU.

Oil and Gas Potential

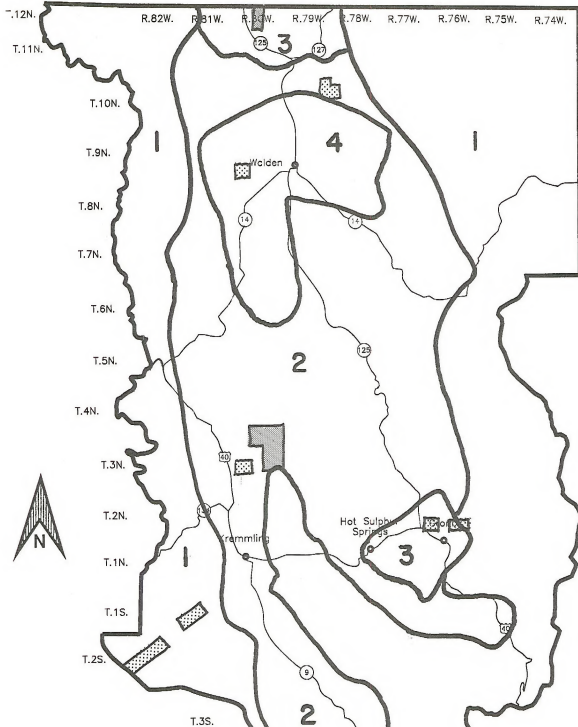
- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High

Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map 2-3





KREMMLING RESOURCE AREA

Resource Area Boundary

No Leasing

No Surface Occupancy

Oil and Gas Potential

1 - None

2 - Low

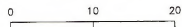
3 - Moderate

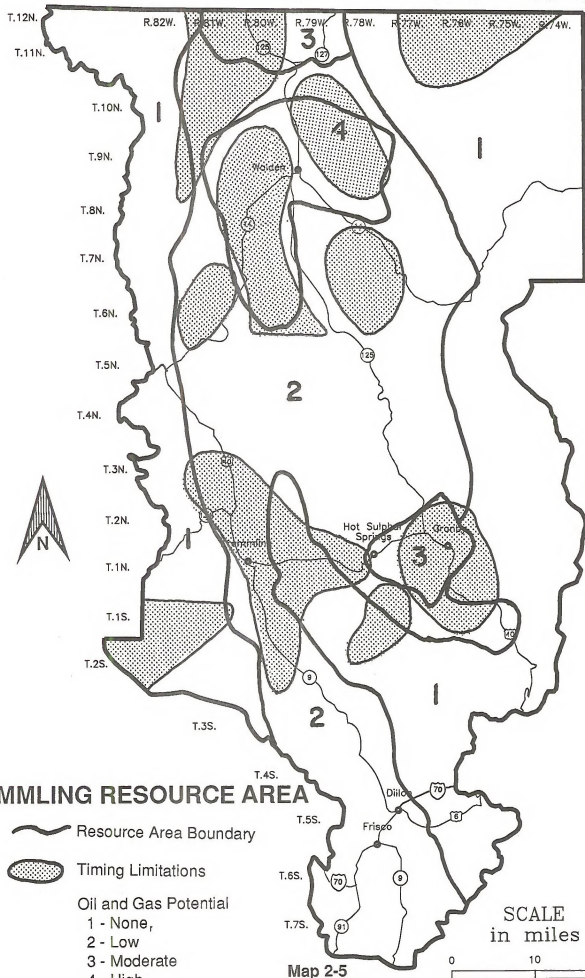
4 - High

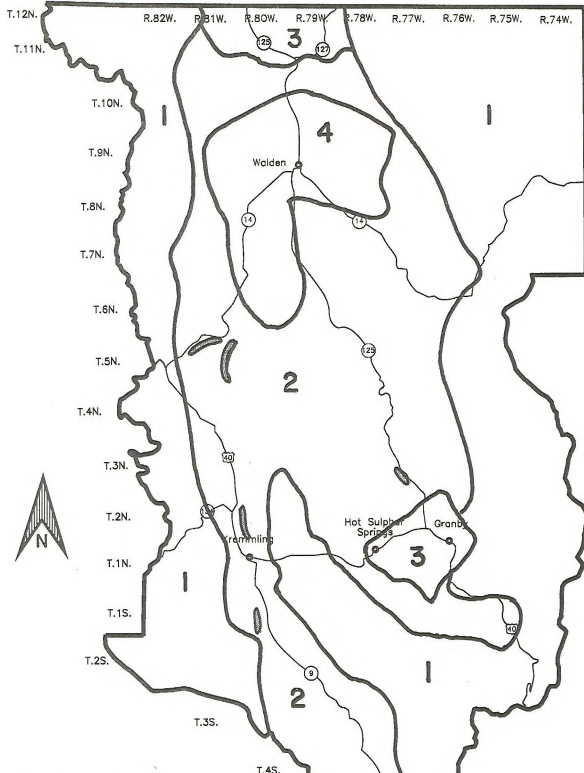
Map 2-4

2-10


SCALE
in miles







KREMMLING RESOURCE AREA

 Resource Area Boundary

 Controlled Surface Use

Oil and Gas Potential

1 - None

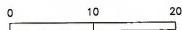
2 - Low

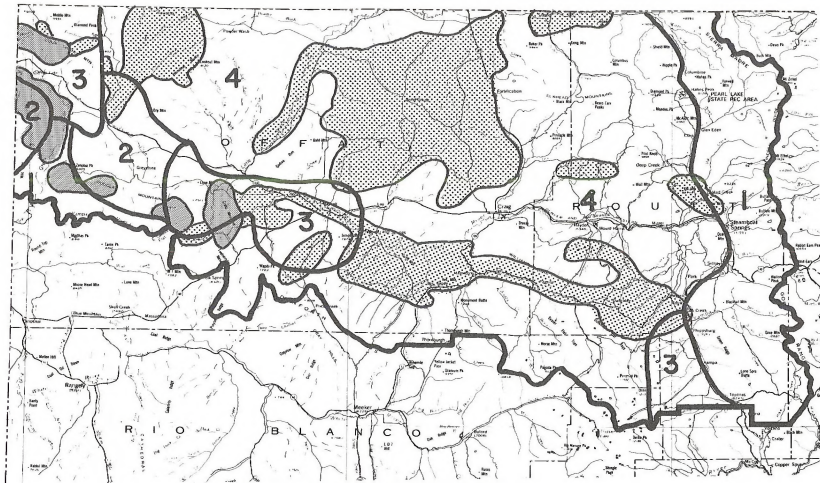
3 - Moderate

4 - High

Map 2-6

SCALE
in miles





LITTLE SNAKE RESOURCE AREA

 Resource Area Boundary

 No Leasing

 No Surface Occupancy

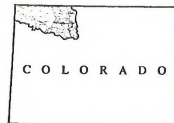
Oil and Gas Potential

1 - None

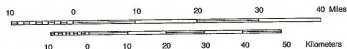
2 - Low

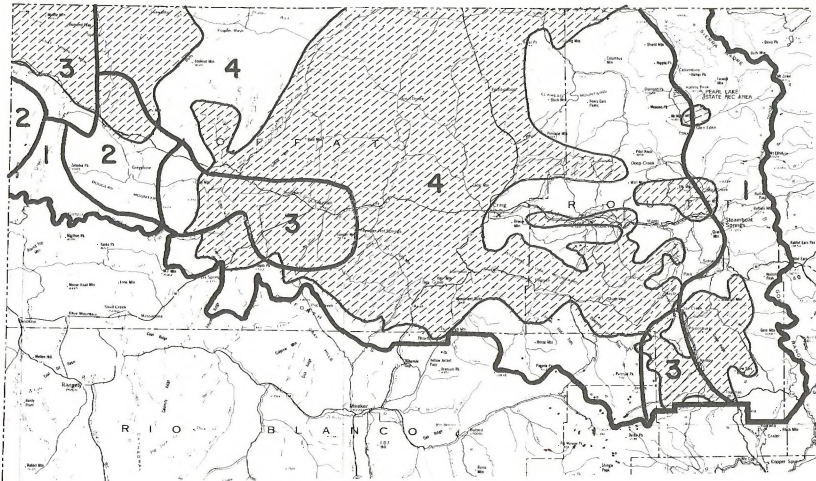
3 - Moderate

4 - High



Scale 1:1,000,000
1 inch equals Approximately 16 miles





LITTLE SNAKE RESOURCE AREA



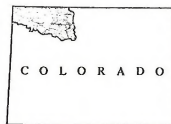
Resource Area Boundary



Timing Limitations

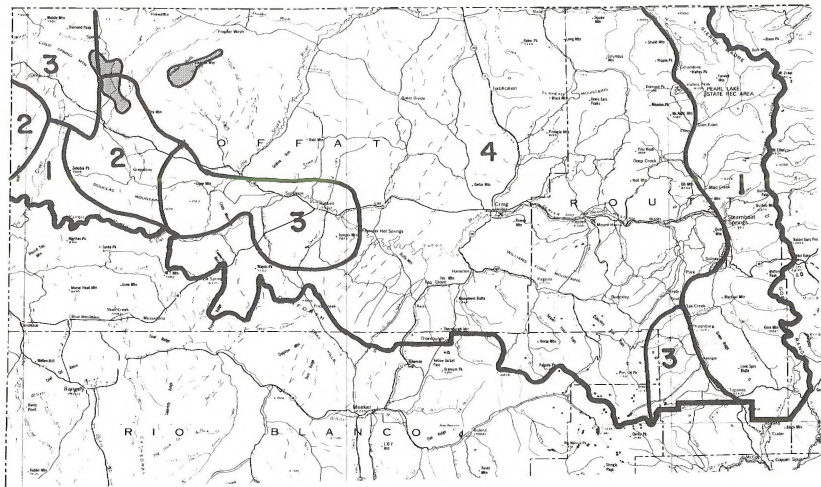
Oil and Gas Potential

- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High

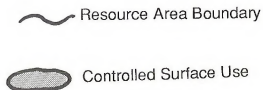


Scale 1:1,000,000
1 inch equals Approximately 16 miles

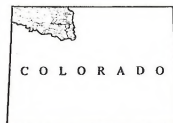




LITTLE SNAKE RESOURCE AREA

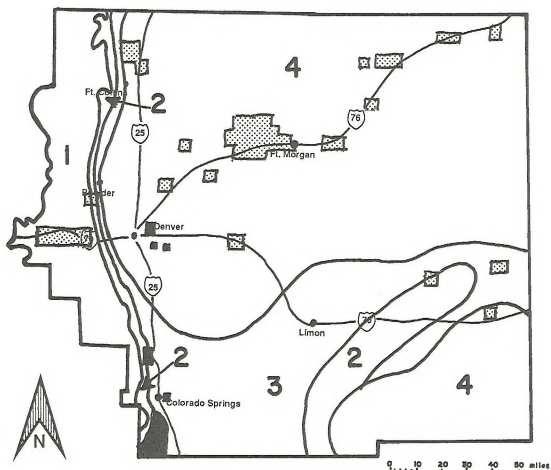


Oil and Gas Potential
1 - None
2 - Low
3 - Moderate
4 - High



Scale 1:1,000,000
1 inch equals Approximately 16 miles






NORTHEAST PLANNING AREA

 Planning Area Boundary

 No Leasing

 No Surface Occupancy

Oil and Gas Potential

1 - None

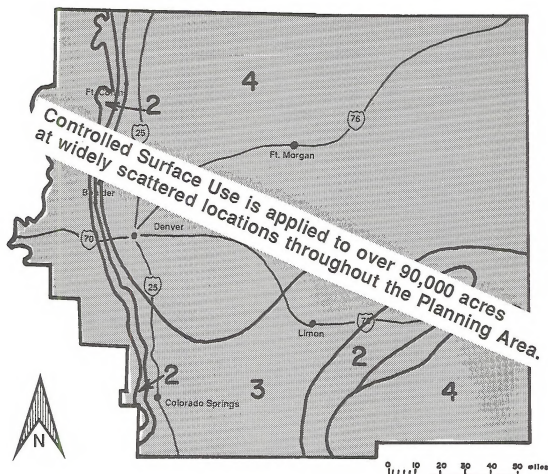
2 - Low

3 - Moderate

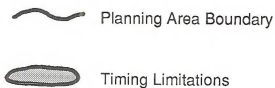
4 - High

Map 2-10

2-16

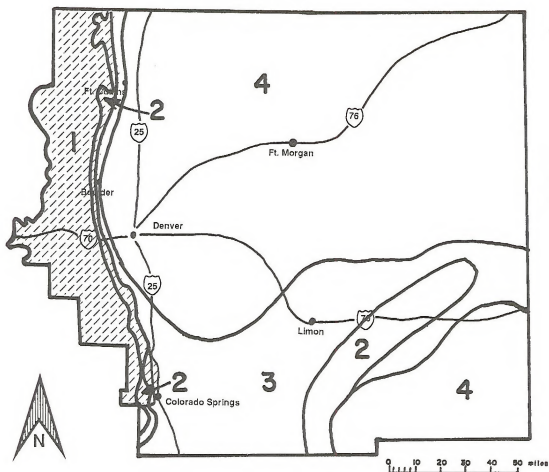


NORTHEAST PLANNING AREA



Oil and Gas Potential

- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High



NORTHEAST PLANNING AREA

 Planning Area Boundary

 Controlled Surface Use

Oil and Gas Potential

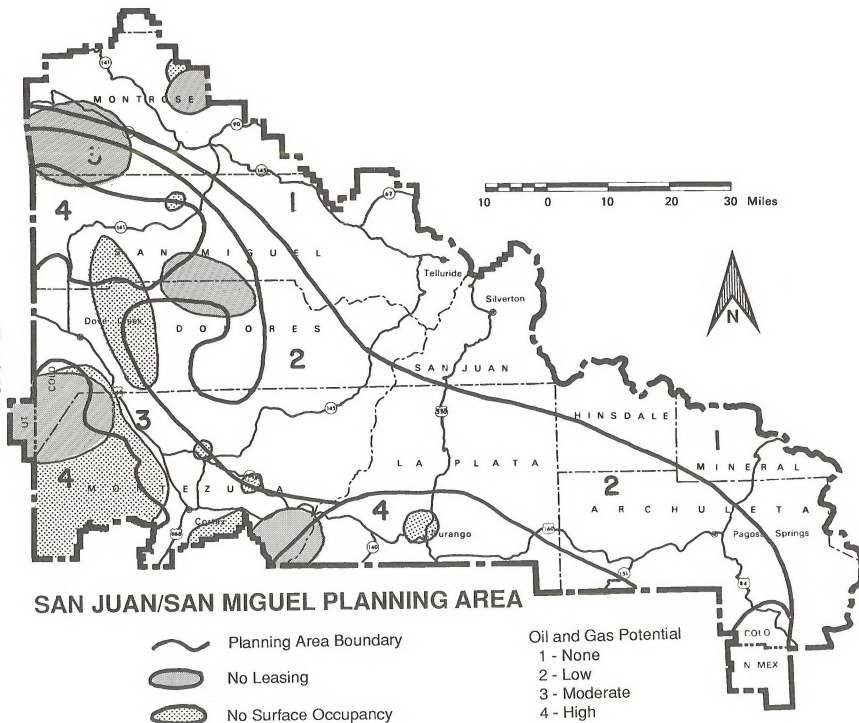
1 - None

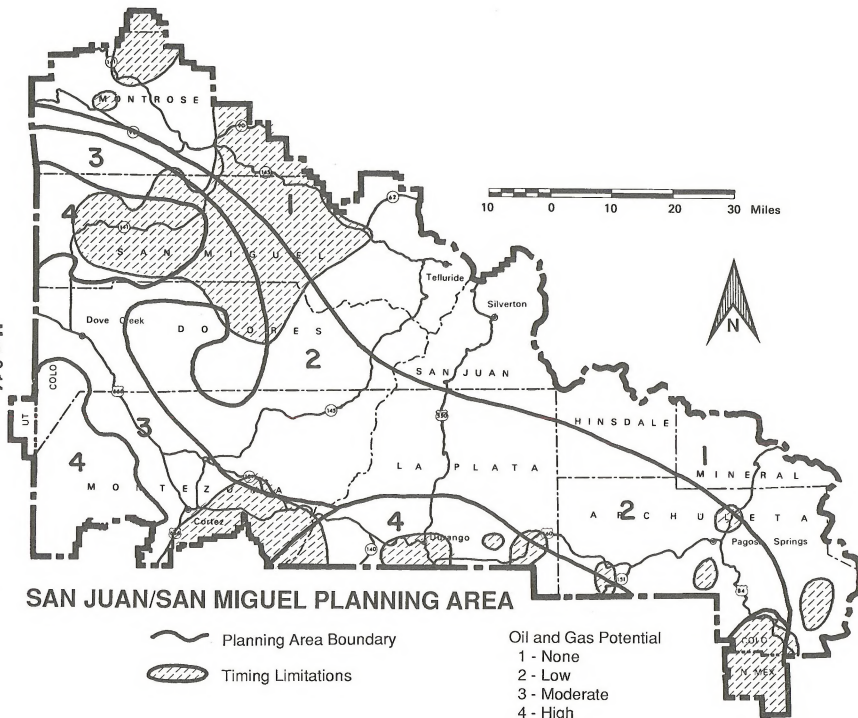
2 - Low

3 - Moderate

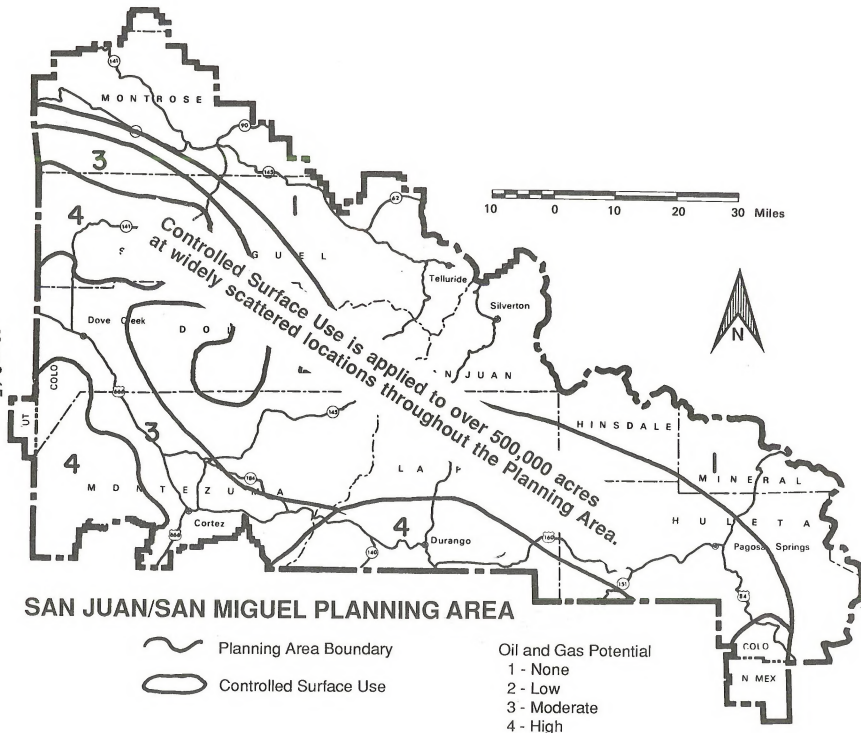
4 - High

Map 2-13





Map 2-15



CHAPTER TWO

matter of policy, where resource uses or values requiring short timing limitations exist on the ground such that overlap would result in a closure of the lease exceeding 60 consecutive days, the Colorado BLM will develop a lease timing stipulation identifying all the known resource use/value conflicts. If a COA is used to mitigate for certain resources such as wildlife limitations, a lease notice may be used to identify such known restrictions at the time of lease issuance (see Appendix E).

Continuation of Present Management Alternative

The Continuation of Present Management Alternative would manage oil and gas leasing, exploration, and development in accordance with decisions and mitigative measures presently in use in the applicable Resource Management Plan (RMP). Tables 2-4, 2-7, 2-10, 2-13, and 2-16 show federal lands available for leasing by Planning Area under the Continuation of Present Management Alternative. This alternative is considered a "no action" alternative because there would be no change from the way the oil and gas resource is currently managed.

Reasonable Foreseeable Development

The projected number of wells to be drilled and acres disturbed are the same under this alternative as in Table 2-1.

Lease Stipulations

Where necessary, the appropriate stipulation is attached to leases when they are offered for sale. The stipulations presently in use are listed by Resource/Planning Area in Appendix G.

Conditions of Approval

In addition to those mitigative measures common to all alternatives, COAs will be considered in determining well site locations and developing mitigation to be attached to NOIs, APDs, and associated rights-of-way before approval under this alternative. These measures will be applied by the Authorized Officer as appropriate on a case-by-case basis. Not all COAs would apply to every field operation. Only those needed in a

particular case will be used. The wording of a COA could be modified to meet the needs of local situations, but the protection level envisioned in these COAs will be maintained. The COAs are displayed in Appendices D and H.

Standard Terms and Conditions Alternative

The Standard Terms and Conditions Alternative analyzes environmental impacts of leasing most of federal oil and gas mineral estate within the affected Resource/Planning Areas, with the exception of those lands withdrawn by law. A copy of the oil and gas lease (Form 3100-11, June 1988), which contains the standard terms and conditions, is provided in Appendix C. Under this alternative, no special stipulations would be attached to new oil and gas leases. If the BLM were to select this alternative, a no leasing designation would be placed on certain areas that contain sensitive or unique resources. Tables 2-5, 2-8, 2-11, 2-14 and 2-17 display the amount of acreage that would be under the no leasing designation. Appendix C contains a list of the areas that would be protected by a no leasing designation should this alternative be selected.

Reasonable Foreseeable Development

The RFD would not change from that predicted in Table 2-1. The EIS analysis did not try to predict the number of wells that may be foregone in the other alternatives because of discretionary no leasing or no surface occupancy stipulations. Sufficient data is not available to determine where drilling interest may occur in specific areas, therefore, the projections are the same for all alternatives.

Conditions of Approval

In addition to those mitigative measures common to all alternatives for each Planning Area, COAs will be considered in determining well site locations and developing mitigation to be attached to NOIs, APDs, and associated rights-of-way. These measures would be applied by the Authorized Officer on a case-by-case basis. Not all COAs would apply to every field

ALTERNATIVES

operation. Only those needed in a particular case would be used. The wording of a COA may be modified to meet the needs of local situations, but the protection level envisioned in these COAs will be maintained. The COAs are displayed in Appendices D and F.

ALTERNATIVE COMPARISON

Proposed Action

Overall vegetation loss could be 17,900 acres which is 1/2 of one percent of the BLM lands in the Study Area. Less than 1/2 of one percent of the livestock forage would be lost. Minor amounts of livestock disturbance could cause a slight drop in calf/lamb crops. There would be a slight loss of forage--1/2 of one percent. Minor amounts of human disturbance are not considered significant. Raptors may be subjected to minor amounts of human disturbance. If the disturbance occurs during the nesting season, minor amounts of losses could occur to the population. Human disturbance would have short-term impacts on the wild horses. Soil erosion would increase but is not considered to be significant. The increased erosion would result in increased sediment and salinity. These increases would be long-term and minor.

Small increases in vehicle traffic and manmade intrusions would degrade the aesthetics to a slight degree. Cultural resources would be subject to increased vandalism due to the improved access, but at the same time, more information would be made available due to the increases in surveys. Exploration and development costs would increase for the oil and gas operators due to the constraints placed upon them. The rate of development may be slightly slower but the overall effort would not be impacted. The amount of reduction is not considered significant and is not quantifiable at this time.

Continuation of Present Management Alternative

The impacts of this alternative are in addition to those listed for the Proposed Action. The impacts to the wildlife may be slightly more due to human disturbances. Impacts to wild horses would be slightly more under this alternative as compared to the Proposed Action.

Standard Terms and Conditions Alternative

The impacts of this alternative are in addition to those listed above the Continuation of Present Management Alternative. The impacts to wildlife would be more substantial. Disturbances during various critical periods would cause losses of fawns/calves and new roads into isolated areas would increase the overall human disturbance factors. Disturbances to raptors during some portion of their critical periods are more probable. High erosion would occur on fragile soil areas which would also increase sedimentation and siltation.

Table 2-19 provides a summary of impacts by resource for each alternative.

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TABLE 2-3. PROPOSED ACTION ALTERNATIVE (GSRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	7,400	19,790	14,370	18,740	60,300
Controlled Surface Use	3,840	113,320	236,210	73,520	426,890
Timing Limitation	0	104,600	473,800	30,000	608,400
NSO	6,006	54,722	47,396	53,524	161,648
No Lease (WSA) ⁽¹⁾	0	0	27,280	0	27,280
No Lease (Discretionary)	0	0	0	0	0
Total ⁽²⁾	17,246	292,432	799,056	175,784	1,284,518

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

TABLE 2-4. CONTINUATION OF PRESENT MANAGEMENT ALTERNATIVE (GSRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	17,640	68,280	41,980	47,276	175,176
Controlled Surface Use	0	0	0	0	0
Timing Limitation	0	163,160	292,780	181,560	637,500
NSO	0	26,426	13,580	5,040	45,046
No Lease (WSA) ⁽¹⁾	0	0	27,280	0	27,280
No Lease (Discretionary)	0	960	0	0	960
Total ⁽²⁾	17,640	258,826	375,620	233,876	885,962

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

TABLE 2-5. STANDARD TERMS AND CONDITIONS ALTERNATIVE (GSRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	12,840	142,739	294,745	121,387	571,711
Controlled Surface Use	0	0	0	0	0
Timing Limitation	0	0	0	0	0
NSO	0	0	0	0	0
No Lease (WSA) ⁽¹⁾	0	0	27,280	0	27,280
No Lease (Discretionary)	1,462	15,110	5,452	15,676	37,700
Total ⁽²⁾	14,302	157,849	327,477	137,063	636,691

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

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**TABLE 2-6. PROPOSED ACTION ALTERNATIVE (KRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	73,620	232,560	44,320	29,700	380,200
Controlled Surface Use	5,000	12,700	3,000	1,600	22,300
Timing Limitation	64,000	63,090	26,400	71,115	224,605
NSO	7,380	11,010	1,200	8,185	27,775
No Lease (WSA) ⁽¹⁾	0	9,415	80	0	9,495
No Lease (Discretionary)	0	625	0	0	625
Total ⁽²⁾	150,000	329,400	75,000	110,600	665,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

**TABLE 2-7. CONTINUATION OF PRESENT MANAGEMENT ALTERNATIVE (KRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	88,997	256,830	61,522	58,942	466,291
Controlled Surface Use	0	0	0	0	0
Timing Limitation	53,000	55,000	10,000	48,000	166,000
NSO	4,003	2,130	398	2,058	8,589
No Lease (WSA) ⁽¹⁾	0	9,415	80	0	9,495
No Lease (Discretionary)	0	625	0	0	625
Total ⁽²⁾	146,000	324,000	72,000	109,000	651,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

**TABLE 2-8. STANDARD TERMS AND CONDITIONS ALTERNATIVE (KRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	140,430	313,843	71,442	108,690	634,405
Controlled Surface Use	0	0	0	0	0
Timing Limitation	0	0	0	0	0
NSO	0	0	0	0	0
No Lease (WSA) ⁽¹⁾	0	9,415	80	0	9,495
No Lease (Discretionary)	5,570	822	398	310	7,100
Total ⁽²⁾	146,000	324,080	71,920	109,000	651,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

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**TABLE 2-9. PROPOSED ACTION ALTERNATIVE (LSRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	12,050	75,870	302,850	374,840	765,610
Controlled Surface Use	6,590	69,920	45,350	266,790	388,650
Timing Limitation	2,900	7,970	140,200	709,150	860,220
NSO	89	514	12,011	45,280	57,894
No Lease (WSA) ⁽¹⁾	0	27,380	8,000	0	35,380
No Lease (Discretionary)	0	0	0	0	0
Total ⁽²⁾	21,629	181,654	508,411	1,396,060	2,107,754

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

**TABLE 2-10. CONTINUATION OF PRESENT MANAGEMENT ALTERNATIVE (LSRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	12,050	70,890	342,940	245,480	671,360
Controlled Surface Use	6,590	69,920	45,350	266,790	388,650
Timing Limitation	2,900	7,970	79,150	839,150	929,170
NSO	0	580	13,560	60,600	74,740
No Lease (WSA) ⁽¹⁾	0	27,380	8,000	0	35,380
No Lease (Discretionary)	0	0	0	0	0
Total ⁽²⁾	21,540	176,740	489,000	1,412,020	1,878,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

**TABLE 2-11. STANDARD TERMS AND CONDITIONS ALTERNATIVE (LSRA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				
	NONE	LOW	MEDIUM	HIGH	TOTAL
Standard Lease Terms	21,300	127,320	408,700	1,245,435	1,802,755
Controlled Surface Use	0	0	0	0	0
Timing Limitation	0	0	0	0	0
NSO	0	0	10,500	3,580	14,080
No Lease (WSA) ⁽¹⁾	0	27,380	8,000	0	35,380
No Lease (Discretionary)	270	0	22,800	2,715	25,785
Total ⁽²⁾	21,570	154,700	450,000	1,251,730	1,878,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

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**TABLE 2-12. PROPOSED ACTION ALTERNATIVE (NPA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				TOTAL
	NONE	LOW	MEDIUM	HIGH	
Standard Lease Terms	10,000	50,000	20,000	160,000	240,000
Controlled Surface Use	90,000	0	0	0	90,000
Timing Limitation	10,000	1,000	10,000	70,000	91,000
NSO	45,600	1,300	13,000	65,100	125,000
No Lease (WSA) ⁽¹⁾	0	0	1,000	0	1,000
No Lease (Discretionary)	0	10,000	80,000	35,000	125,000
Total ⁽²⁾	155,600	62,300	124,000	330,100	672,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

**TABLE 2-13. CONTINUATION OF PRESENT MANAGEMENT ALTERNATIVE (NPA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				TOTAL
	NONE	LOW	MEDIUM	HIGH	
Standard Lease Terms	114,000	60,000	100,000	220,000	494,000
Controlled Surface Use	0	0	0	0	0
Timing Limitation	1,000	1,000	8,000	70,000	80,000
NSO	1,000	1,000	3,000	10,000	15,000
No Lease (WSA) ⁽¹⁾	0	0	1,000	0	1,000
No Lease (Discretionary)	0	0	0	10,000	10,000
Total ⁽²⁾	116,000	62,000	112,000	310,000	600,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

**TABLE 2-14. STANDARD TERMS AND CONDITIONS ALTERNATIVE (NPA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING**

	POTENTIAL				TOTAL
	NONE	LOW	MEDIUM	HIGH	
Standard Lease Terms	101,000	32,000	11,000	255,000	399,000
Controlled Surface Use	0	0	0	0	0
Timing Limitation	0	0	0	0	0
NSO	0	0	0	0	0
No Lease (WSA) ⁽¹⁾	0	0	1,000	0	1,000
No Lease (Discretionary)	15,000	30,000	100,000	55,000	200,000
Total ⁽²⁾	116,000	62,000	112,000	310,000	600,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

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TABLE 2-15. PROPOSED ACTION ALTERNATIVE (SJ/SMPA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING

	POTENTIAL				TOTAL
	NONE	LOW	MEDIUM	HIGH	
Standard Lease Terms	322,180	103,633	117,082	178,977	721,872
Controlled Surface Use	271,840	93,040	134,850	65,280	565,010
Timing Limitation	107,050	25,887	93,635	118,826	345,398
NSO	4,540	1,000	33,918	70,670	110,128
No Lease (WSA) ⁽¹⁾	7,908	2,560	54,459	38,225	103,152
No Lease (Discretionary)	0	0	0	0	0
Total ⁽²⁾	713,518	226,120	433,944	471,978	1,845,560

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

TABLE 2-16. CONTINUATION OF PRESENT MANAGEMENT ALTERNATIVE (SJ/SMPA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING

	POTENTIAL				TOTAL
	NONE	LOW	MEDIUM	HIGH	
Standard Lease Terms	326,400	100,893	152,320	261,120	840,733
Controlled Surface Use	0	0	0	0	0
Timing Limitation	130,208	27,387	102,437	103,678	363,710
NSO	600	0	13,350	16,475	30,425
No Lease (WSA) ⁽¹⁾	7,908	2,560	54,459	38,225	103,152
No Lease (Discretionary)	0	0	0	0	0
Total ⁽²⁾	465,116	130,840	322,566	419,498	1,338,020

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

TABLE 2-17. STANDARD TERMS AND CONDITIONS ALTERNATIVE (SJ/SMPA)
AVAILABILITY OF LANDS (IN ACRES) FOR FLUID MINERAL LEASING

	POTENTIAL				TOTAL
	NONE	LOW	MEDIUM	HIGH	
Standard Lease Terms	452,004	127,960	232,549	300,303	1,112,816
Controlled Surface Use	0	0	0	0	0
Timing Limitation	0	0	0	0	0
NSO	0	0	0	0	0
No Lease (WSA) ⁽¹⁾	7,908	2,560	54,459	38,225	103,152
No Lease (Discretionary)	600	320	14,350	59,762	75,032
Total ⁽²⁾	460,512	130,840	301,358	398,290	1,291,000

(1) Interim Management for all Wilderness Study Areas is "No Lease" until Congress acts on wilderness designation.

(2) Some stipulations overlap, therefore, the total of all six categories may add up to more than the total federal acreage shown next to "Total" for each area.

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TABLE 2-18. PROPOSED ACTION--NO SURFACE OCCUPANCY

	ACRES
GSRA	
Major River Corridors	42,148
Rifle Falls Fish and Glenwood Springs Fish Hatcheries	15,200
Hack Lake	3,480
Rifle Mt. Park	400
Sunlight Peak Area	1,900
Municipal Watersheds	5,960
Thompson Creek	4,286
Bull Gulch	10,214
Deep Creek	4,400
Glenwood Springs Debris Hazard Zone	7,160
Garfield Creek State Wildlife Area	12,520
Basalt State Wildlife Area	4,460
West Rifle Creek State Wildlife Area	1,160
Raptor Nests	45,000
Sage Grouse Leks	3,360
KRA	
Kerr Coal Mine	400
Sage Grouse Leks	10,000
Raptor Nests	6,000
Water Fowl Areas	3,000
Special Status Plants	1,240
Ammonite ACEC	200
North Park Phacilia ACEC	300
Windy Gap RMA	400
Colorado River SRMA	4,870
North Sand Hills SRMA	1,325
Sulfur Range District Administrative Site	40
LSRA	
Sage Grouse Lek	2,400
Raptor Nests	28,560
Peregrine Falcon Nest	40
Bald Eagle Roost	1,200
Sand Hill Crane Habitat	240
Little Yampa SRMA	19,840
Cedar Mt. SRMA	880
Steamboat and Pearl Lake State Parks	384
Cross Mountain Canyon ACEC	3,000
Limestone Ridge ACEC	1,350
NPA	
I-70 Corridor	10,000
State, County, and City Parks	15,000
Reservoir and Railroad Rights-of-way	30,000
Reservoir and River Riparian Areas	30,000*
Wildlife Area (Includes Grouse, Raptors, Bald Eagles, Peregrine Falcon, Waterfowl, and Shorebirds)	40,000*

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TABLE 2-18. (continued)

SJ/SMPA	
Cannonball Ruin	80
Lowery Ruins & Associations	880
Dominguez-Escalante Ruins	55
Tabeguache Cave II and Tabeguache Canyon	3,200
Dolores Cave	60
Tabeguache Pueblo	200
McLean Basin Towers and Associations	200
Painted Hand Petroglyphs	240
Painted Hand Ruin	160
Indian Henry's Cabin	280
Lighting Tree Tower Group	200
Battle Rock	40
Easter Ruin	160
Seven Towers Ruin Group	120
Hovenweep Canyon	3,400
East Cortez	6,420
Goodman Canyon and Goodman Point Buffer Zones	1,560
Bass Ruin Complex	500
Sandstone Canyon	2,840
Brewer Well Complex	590
Yellow Jacket Canyon	5,120
Basin Wickiup Village	400
Woods Canyon	980
Bridge Canyon	1,120
Porter Ruin	120
Upper Ruin Canyon	640
Bowdish Canyon	1,000
Sand and East Rock Canyon	5,880
Squaw/Papoose, Cross, and Cahone Canyons	28,464
Hovenweep National Monument Cooperative Management Strategies Area	600
Cutthroat Castle Buffer Zone	320
Dolores River Canyon	22,464
Bridge Canyon (McElmo) RNA	443
Menefee and Weber Mountains	13,432
Horse Range Mesa Paleontological Site	40
Sage Grouse Leaks	960
(Perins Peak/Mesa Verde)	2,600
Raptors	1,160
Bald Eagle Nest and Roost Sites	3,240

*Some overlap in Wildlife and Riparian Areas

TABLE 2-19. ALTERNATIVE COMPARISON

Resource	Alternative		
	Proposed Action	Continuation of Present Management ^{1/}	Standard Terms and Conditions ^{2/}
Climate and Air Quality	Very minor, local	-	-
Vegetation	17,900 acres disturbed	-	-
Livestock Grazing	Minor disturbance, 1,800 AUMs lost	-	-
Wildlife	Minor loss of habitat. Increased harassment "may affect" T&E fish.	+	+
Wild Horses	Minor disturbance	-	+
Soils	Minor short-term losses, increased erosion	-	+
Water	Minor increases in sediment and salinity	-	+
Forestry	Insignificant losses	-	-
Recreation	Minor disturbances	-	-
Visual	Minor, local	-	-
Cultural	Increased surveys, minor losses	-	-
Paleontology	Increased surveys, minor losses	-	-
Wilderness	None	-	-
Lands and Realty Actions	None	-	-
Transportation	Increased access	-	-
Social and Economic	Insignificant	-	-
Areas of Critical Environmental Concern	None	-	-
Minerals	Loss of oil and gas resource, slightly higher recovery costs, minor loss of coal recovery	+	+

^{1/} (-) - Same degree of impact as Proposed Action.

(+) - Greater impact than Proposed Action.

^{2/} (-) - Same degree of impact as Continuation of Present Management.

(+) - Greater impact than Continuation of Present Management

CHAPTER THREE

AFFECTED ENVIRONMENT

CHAPTER THREE

AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the affected environment in the Study Area. The Study Area consists of the five areas described in Chapter 1 that correspond to coverage of the five Resource Management Plan/Environmental Impact Statements (RMP/EIS) being amended: Glenwood Springs Resource Area (GSRA), Kremmling Resource Area (KRA), Little Snake Resource Area (LSRA), Northeast Planning Area (NPA), and the San Juan/San Miguel Planning Area (SJ/SMPA).

Generally, the environmental resources described are those that may be affected by the Proposed Action or one of the other alternatives. At times, an environmental resource will be described to give the reviewer a clearer picture of the setting, or to make a link between two affected resources. Several environmental resources will not be discussed because they will not be impacted and are not necessary for a clear picture of the Study Area.

Descriptions of environmental resources are organized with an overview section containing a general description applicable to the entire Study Area. This is followed by more detailed descriptions tied to specific areas when necessary for an understanding of impacts or mitigating measures.

Readers interested in details of a particular environmental resource or wishing additional information about a particular Resource Area, should consult with Resource Area Offices. These offices have the current (maintained) and more detailed RMP/EIS's which are available for public review.

CLIMATE AND AIR QUALITY

Climate Overview

The Study Area is comprised of a highland climatic type in the mountainous regions and a continental, cold steppe climate type in the remainder of the Study Area (where most BLM-administered lands are located.)

The highland climatic type is dominated by its mountainous topography. This complex topography causes considerable variation in site-specific temperature, precipitation, and surface winds. Temperatures are much colder than lowlands at similar latitudes, and may become frigid when cold air drains into mountain valleys. Freezing temperatures are possible throughout the year. Annual precipitation is highly variable, due primarily to the orographic effect of local topography. Precipitation is greatest on the windward side, with amounts increasing dramatically with elevation. Snowfall is possible throughout the year, with accumulation increasing with elevation. Diurnal up- and down-valley winds predominate. Mountain inversions may form and last for several days.

The continental, cold steppe climate type is typified by low to moderate precipitation which occurs mostly in summer. The amount of precipitation varies greatly from year to year. Evaporation is moderate to high. There is a wide temperature variation from cold winters and hot summers. There are four distinct seasons; spring occurs suddenly and warms quickly. Extremely frigid conditions and blizzards can occur, but severe weather conditions such as floods and damaging hail are rare. Tornadoes occasionally occur in the eastern most portion of the Study Area. Winter inversions are common and may last for several days.

CHAPTER THREE

Although atmospheric mixing varies throughout the Study Area, dispersion is normally good in spring and summer, but limited in the winter. Inversions are formed under stable conditions, trapping pollutants within a layer of air. Moderate summer inversions are typical during the evening and dissipate at dawn. Winter inversions are stronger and last longer. Inversions are enhanced by weak pressure gradients, cold clear nights, snow cover, and basin topography.

Climate Condition by Resource/Planning Area

The following Resource/Planning Area descriptions are necessarily broad generalizations of very complex climatic conditions (PEDCO Environmental, Inc. 1981). Tables J-1, J-2, and J-3 (Appendix J) provide monitored data for specific locations within each area. However, this data can not be extrapolated throughout the Study Area. Map 3-1 shows annual average precipitation throughout Colorado. Site-specific monitoring is necessary to determine local climatic conditions.

Glenwood Springs Resource Area

Average annual precipitation ranges from ten to 30 inches, which may occur anytime throughout the year. January temperatures range from an average minimum temperature of ten degrees Fahrenheit (F) to an average maximum temperature of 35 degrees F. July temperatures typically average from 45 (minimum) to 85 (maximum) degrees F. Frost-free periods normally last two to three months. Winds occur mostly along the river drainages, and winter inversions are common in the mountain valleys.

Kremmling Resource Area

Average annual precipitation is ten to 25 inches, with a small peak due to summer thundershowers. January temperatures range from an average minimum temperature of zero degrees F to an average maximum temperature of 32 degrees F. July temperatures typically average from 35 (minimum) to 80 (maximum) degrees F. Frost-free periods normally last less than two months. Cold air drainage makes the mountain valleys frigid in winter, and enhances strong winter inversions.

Little Snake Resource Area

Average annual precipitation varies from ten to 16 inches, occurring uniformly throughout the year. January temperatures range from an average minimum temperature of zero degrees F to an average maximum temperature of 32 degrees F. July temperatures typically average from 45 (minimum) to 85 (maximum) degrees F. Frost-free periods normally last two to three months. Pressure gradient (synoptic) winds predominate, and large-scale, persistent inversions may occur in winter.

Northeast Planning Area

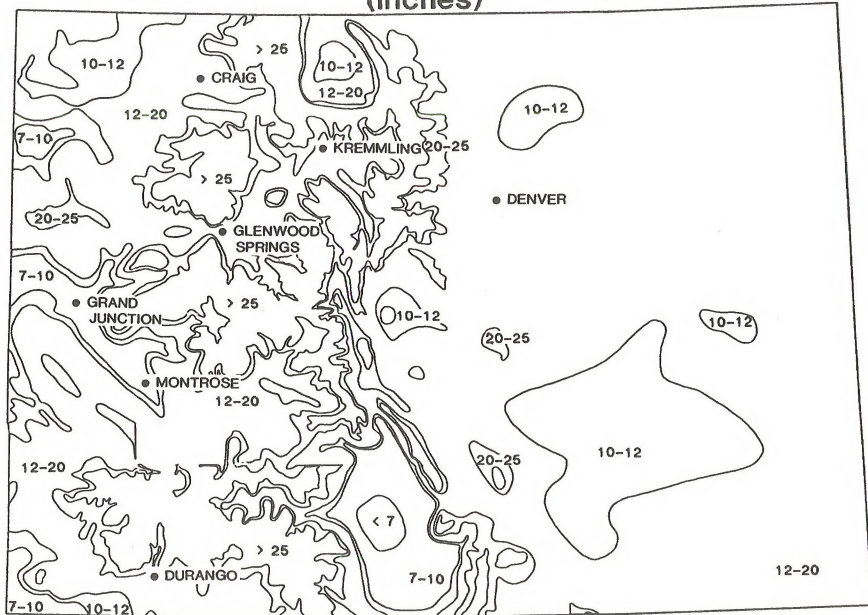
Average annual precipitation is ten to 20 inches along the plains, and up to 30 inches in the foothills, occurring mostly due to summer thunderstorms. January temperatures range from an average minimum temperature of 15 degrees F to an average maximum temperature of 45 degrees F. July temperatures typically average from 60 (minimum) to 90 (maximum) degrees F along the plains, and 45 to 80 in the foothills. Frost-free periods normally last three to five months. In winter, heavy snows may occur during up-slope storms, and unusually warm temperatures may occur due to down-slope (Chinook) winds.

San Juan/San Miguel Planning Area

Climatic conditions are highly variable, ranging from desert conditions in the extreme southwest to alpine conditions in the high mountain locations. Average annual precipitation ranges from eight to 30 inches, occurring mostly in the summer due to convective thunderstorms. January temperatures range from an average minimum temperature of zero to ten degrees F, to an average maximum temperature of 40 degrees F. July temperatures typically average from 50 (minimum) to 90 (maximum) degrees F at lower elevations, and from 40 (minimum) to 75 (maximum) degrees F in the mountains. Frost-free periods vary from less than one to three months.

ANNUAL PRECIPITATION - COLORADO

(inches)



MAP 3-1

CHAPTER THREE

Air Quality Overview

The existing air quality throughout much of the Study Area is unknown; little monitoring data are available for most pollutants. However, in the undeveloped regions of the western United States, ambient pollutant levels are expected to be near or below the measurable limits. Locations vulnerable to decreasing air quality from extensive development include immediate operation areas (mining operations, power plants, etc.) and local population centers (automobile exhaust, residential wood smoke, etc.). Noise levels are site-specific and vary continuously.

Air Quality Regulations

National ambient air quality standards (Table J-4, Appendix J) limit the amount of specific pollutants allowed in the atmosphere: carbon monoxide (CO), lead (PB), nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), and particulate matter (total suspended particulates-TSP and inhalable particulates-PM₁₀). State standards include these parameters, but may also be more stringent. The standards protect health (primary standards) and welfare (secondary standards).

Areas which consistently violate federal standards because of man-caused activities are classified as "nonattainment" areas, and must implement a plan to reduce ambient concentrations below the maximum pollution standards. Under EPA's "Fugitive Dust Policy," areas which violate the TSP standards, but lack significant industrial particulate sources and have a population less than 25,000, are designated as "unclassified" (neither "attainment" nor "nonattainment"). "Unclassified" areas are generally exempt from following the Clean Air Act offset provisions, retrofit controls, and new source control requirements established for "nonattainment" areas.

Through the Clean Air Act Amendments of 1977, Congress established a system for the Prevention of Significant Deterioration (PSD) of "attainment" and "unclassified" areas. Areas are classified by the additional amounts of NO₂, SO₂, and TSP degradation which would be allowed. PSD Class I areas, predominantly National Parks and certain Wilderness Areas, have the greatest

limitations; virtually any degradation would be significant. Areas where moderate, controlled growth can take place were designated as PSD Class II. PSD Class III areas allow the greatest degree of impacts. The state of Colorado has established a similar system of Category 1, 2, and 3 areas. PSD Class I regulations also address the potential for impacts to Air Quality Related Values (AQRVs). These AQRVs include visibility, odors, and impacts to flora, fauna, soils, water, geologic, and cultural structures. A possible source of impact to AQRVs is acid precipitation. Map 3-2 shows the locations of PSD Class I, Colorado Category 1, and nonattainment areas in Colorado.

Existing Air Quality

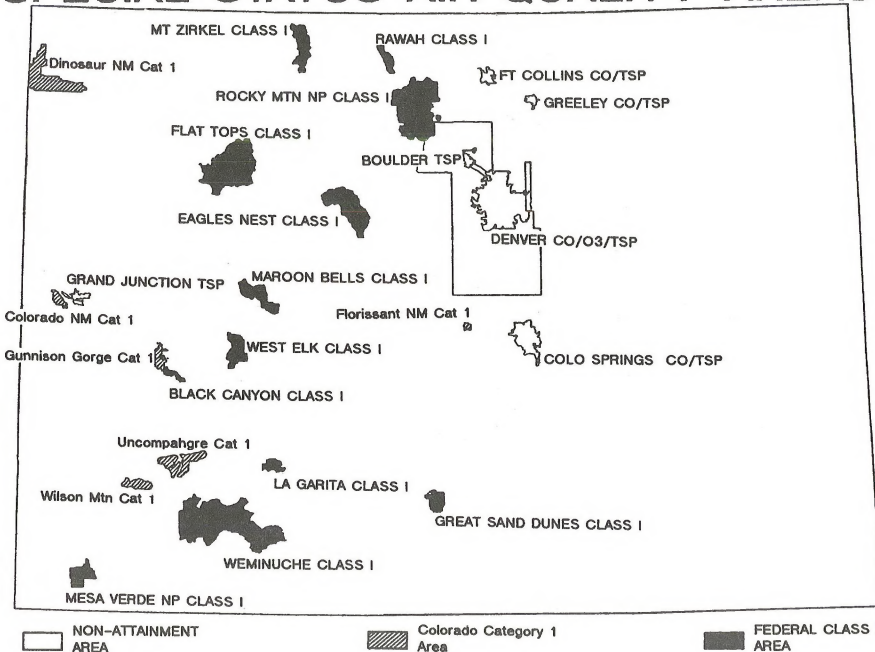
A discussion of existing air quality conditions in the Study Area is necessarily a broad generalization of very complex air quality conditions. Since this information can not be extrapolated throughout each Resource/Planning Area, site-specific monitoring is necessary to determine local conditions. Estimates of air pollutant concentrations are provided in Table J-5, Appendix J (Chick 1989).

For most pollutants, the Study Area has been designated as either "attainment" or "unclassified." The primary exception is urban pollution around isolated tracts within the NPA, and high inhalable particulate levels due to residential wood burning in some urban and rural towns. Except for these areas, BLM-administered lands are classified PSD Class II.

Particulate matter concentrations are expected to be higher near industrial areas, towns, and unpaved roads. Inhalable particulate levels are high in areas with significant combustion sources (urban areas, industrial facilities, residential wood smoke). Throughout Colorado, six areas are believed to exceed the inhalable particulate standards, and 11 additional areas are conducting monitoring to determine if the standards are exceeded.

Similarly, total suspended particulate levels may be high due to wind blown dust in arid locations, or from combustion sources.

SPECIAL STATUS AIR QUALITY AREAS



MAP 3-2

3-5

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Eight areas exceed the public health standard; 11 areas exceed the public welfare standard. Carbon monoxide levels exceed the standard along the Front Range, and nitrogen dioxide and ozone standard are exceeded in the Denver metropolitan area. Lead and sulfur dioxide levels are well within the standards throughout the state. Visibility and acid precipitation are monitored at isolated locations in the Study Area.

VEGETATION

A wide range of vegetative types occur on public lands and surface lands overlying the federal mineral estate within the Study Area. The potential of locating threatened and

endangered plant species in each of the areas will increase as inventories are completed. Presently, three of the five areas contain listed species and all but one, the NPA, contain federally-listed candidate species.

A federal candidate species is one that is being studied to determine if it is eligible to be listed as either threatened or endangered. A list of special status plant species and their occurrence by Resource/Planning Area is shown in Table 3-1. Special status species include federally-listed threatened and endangered species and federal candidate species (see Appendix P). Species that are listed as threatened or endangered are protected under the Endangered Species Act

TABLE 3-1. A LIST OF SPECIAL STATUS PLANT SPECIES AND THEIR COMMON OCCURRENCE AMONG THE RESOURCE/PLANNING AREAS

COMMON NAME	SCIENTIFIC NAME	STATUS	OCCURRENCE
Uinta Basin hookless cactus	<u>Sclerocactus glaucus</u>	FT	GSRA, SJ/SMPA
North Park phacelia	<u>Phacelia formosula</u>	FE	KRA
Osterhout milkvetch	<u>Astragalus osterhoutii</u>	FT	KRA
Penland beardtongue	<u>Penstemon penlandii</u>	FT	KRA
Mancos milkvetch	<u>Astragalus humillimus</u>	FE	SJ/SMPA
Knowlton cactus	<u>Pediocactus knowltonii</u>	FE	SJ/SMPA
Spineless hedgehog cactus	<u>Echinocereus triglochidiatus</u>	FE	SJ/SMPA
Mesa Verde cactus	<u>Sclerocactus mesae-verdae</u>	FT	SJ/SMPA
Harrington beardtongue	<u>Penstemon harringtonii</u>	FC	GSRA, KRA
Parachute beardtongue	<u>Penstemon debilis</u>	FC	GSRA
Phacelia	<u>Phacelia submutica</u>	FC	GSRA
Penland eutrema	<u>Eutrema penlandii</u>	FC	KRA
Hamilton milkvetch	<u>Astragalus hamiltonii</u>	FC	LSRA
Ownbey thistle	<u>Cirsium ownbeyi</u>	FC	LSRA
Gibbins penstemon	<u>Penstemon gibbensii</u>	FC	LSRA
Mancos columbine	<u>Aquilegia micrantha</u>	FC	SJ/SMPA
Cronquist milkvetch	<u>Astragalus cronquistii</u>	FC	SJ/SMPA
Schmoll milkvetch	<u>Astragalus schmolliae</u>	FC	SJ/SMPA
Mancos saltbush	<u>Atriplex pleiantha</u>	FC	SJ/SMPA
Kachina daisy	<u>Erigeron kachinensis</u>	FC	SJ/SMPA
Pagosa gilia	<u>Ipomopsis polyantha</u>	FC	SJ/SMPA
Frosty bladderpod	<u>Lesquerella pinnosa</u>	FC	SJ/SMPA
Paradox lupine	<u>Lupinus crassus</u>	FC	SJ/SMPA
Dolores Skeleton plant	<u>Lygodesmia doloresensis</u>	FC	SJ/SMPA
Porter's needlegrass	<u>Prillagostris porterii</u>	FC	KRA
Small flowered beardtongue	<u>Penstemon parviflorus</u>	FC	SJ/SMPA
Mesa Verde stickseed	<u>Hackelia gracilentia</u>	FC	SJ/SMPA
Wetherill milkvetch	<u>Astragalus wetherillii</u>	FC	LSRA

Codes:

FE = Federally endangered species

FT = Federally threatened species

FC = Federal candidate species

AFFECTED ENVIRONMENT

(ESA). Although candidate species are not protected by the ESA, they are afforded protection through BLM policy.

The Colorado Natural Areas Program (CNAP) maintains a list of plant species of special concern to the state of Colorado. These species are not protected by state statute but are provided appropriate protection by the BLM.

The major vegetative types on public lands are described by Resource/Planning Area.

Glenwood Springs Resource Area

Major vegetative types occurring in this area include: mountain shrub--20 percent, semi-desert shrub--27 percent, conifer woodland--39 percent, conifer forest--six percent, and broadleaf tree/riparian--seven percent. Grasslands and riparian areas also occur on public lands, but they make up one percent.

The mountain shrub community is composed primarily of oakbrush and service berry. It provides a very important source of food and cover especially during the fall, winter, and spring months for many species of wildlife, and nongame species. This habitat type is currently being lost to housing development on private lands.

The semi-desert shrub community is composed primarily of sagebrush, with lesser amounts of greasewood and saltbush.

The conifer community is composed of two distinct habitat types--conifer forest (spruce-fir) and conifer woodland (pinyon-juniper). The conifer forest provides thermal and hiding cover and some food during the summer months for wildlife, and nesting habitat for a variety of birds and small mammals. The conifer woodland habitat type provides very important winter thermal and hiding cover and food for many wildlife species. Changes occur in the conifer habitats as a result of fuel wood cutting, timber harvesting, pine beetle infestations, and urban development.

Aspen stands and riparian-related species such as cottonwood, willow, grass, and forb are a small but significant vegetative type. Aspen stands provide food and cover for a wide variety of wildlife and livestock. Elk calving areas in this Resource Area are almost

always associated with aspen benches. Riparian-related vegetation provides essential food, cover, and nesting habitat for many aquatic and semi-aquatic wildlife species. Although insignificant in overall acreage, it is used by about 75 percent of the wildlife species sometime during their life cycle and provides soil stabilization.

In this Resource Area, most of the riparian habitat occurs on private land along the major rivers and their tributaries. The most important riparian habitat on public land occurs along the Colorado River from Glenwood Springs west to the Resource Area boundary. Throughout the Resource Area, some riparian habitat has been severely impacted by road construction, gravel extraction, water diversions, and livestock grazing.

The following plant species are known or suspected to occur in the Resource Area. All of the listed plants are protected by the BLM. Appendix K contains a complete list of all federal and state species. They are shown on Map K-1 (Appendix K). An Ex-Candidate species is one that was previously considered by the U.S. Fish and Wildlife Service (USFWS) as a candidate for either threatened or endangered status but was found to be abundant and not in immediate danger.

Kremmling Resource Area

There are 13 distinct vegetative types, four of which account for more than 90 percent of the total vegetative cover in the Resource Area. These four types include sagebrush (58 percent), irrigated meadow (14 percent), lodgepole pine (13 percent), and quaking aspen (7 percent). There is a consistent trend in the distribution of the four major vegetative communities throughout North Park and Middle Park. The lower elevation basins are dominated by steppe vegetation, consisting primarily of rolling sagebrush hills and alluvial terraces formerly converted from sagebrush to irrigated meadow. At the higher elevations, this steppe vegetation gives way to expansive forested areas dominated by lodgepole pine. Sagebrush communities constitute the most characteristic vegetation of the drier valley, terrace, bench, and foothill terrain, which ranges between 7,000 and 10,000 feet in elevation.

CHAPTER THREE

Although riparian vegetative types account for only about one percent of the total land coverage, they are one of the most important ecological components of the local environment. They provide water and shade for domestic livestock, valuable nesting areas for raptors and other birds, and food and cover for many species of riparian communities. They often form a complex biotic network with the streams along which they are found. This riparian/stream interaction is necessary to maintain acceptable water quality and suitable habitat for fish and other aquatic organisms.

Poisonous plants are prevalent throughout the Resource Area, although few areas contain concentrations of poisonous species large enough to seriously threaten livestock or wildlife.

Little Snake Resource Area

Eleven different vegetative types, based on major plant communities, have been identified within the Resource Area. Estimated acreages for these are shown in Table 3-2. Improved pastures, sprayed areas, burns, and other manipulated (treated) sites are included in the acreages for each vegetative type.

No federally-listed endangered or threatened plant species are known to occur in the Resource Area. However, four species that are candidates for listing as endangered occur in Moffat County.

The Resource Area also contains a number of plants on the Colorado BLM sensitive plants list, all of which are usually found in somewhat remote, isolated, and relatively inaccessible areas (see Table L-1,

Appendix L). Potential habitat for these sensitive plants are not completely inventoried.

Northeast Planning Area

The vegetative communities existing on public lands or subsurface estate in the Planning Area has never been completely inventoried and mapped. Major vegetative types occurring are plains grasslands, foothills grasslands, riparian, and forest lands. Croplands are widespread. The plains grasslands are primarily shortgrass in the western portion dominated by blue grama and buffalo grass. Eastward the vegetation changes to a sandsage-bluestem prairie of medium tall grasses with small shrubs. Dominate species include bluestems, prairie sandreed, and sand sage. Foothills grassland and mountain shrub lands occupy the transition zones between plains grassland and forest types. Grassland types are typified by various wheatgrasses, brome, needlegrass, and several forbs. Various shrubs are also common, including mountain mahogany and Gambel's Oak. Riparian vegetation occurs along streams, drainage ways, and around reservoirs. Large streams and flood plains support overstories of cottonwoods and understories of willows, water tolerant grasses, and sedges. Willows are also found along narrow stream channels and in the foothills. Alder often occurs in association with willows.

No known threatened or endangered species exist on public lands in the Planning Area. The extent to which such plants may occur on private or state lands overlying federal mineral estate has not been inventoried.

San Juan/San Miguel Planning Area

This area contains seven major vegetative types (see Table 3-2). Of these, three types account for 87 percent of the vegetation present--(1) pinyon-juniper woodland (60 percent), (2) sagebrush-grassland complex (18 percent), and (3) salt desert shrub (nine percent).

Riparian vegetation is present throughout the Planning Area in association with river bottoms and other perennial and intermittent streams. Totalling less than one percent of

TABLE 3-2. ESTIMATED PLANT COMMUNITY ACREAGES

Community Type	Acres
Sagebrush	711,900
Salt Shrub	137,400
Pinyon-Juniper	244,700
Greasewood	28,100
Conifers	23,700
Aspen	14,300
Mountain Shrub	16,100
Grasslands	5,600
Riparian	3,000
Badlands	22,000
Miscellaneous Landforms	48,400

Note: acreage figures are approximate.

AFFECTED ENVIRONMENT

the land acreage in the area, riparian vegetation still is a vital ecological component of the environment. It provides many valuable and diverse habitat features essential to many species of terrestrial and aquatic wildlife. Overall, the riparian vegetative type has a high potential for recovery and improvement following disturbance.

Sagebrush-grassland community is the major vegetative type in the upper valleys and basins with terrain ranging between 5,000 and 7,500 feet in elevation. Large areas in this vegetation complex are classified as crucial winter range for several big game species. Areas at higher elevations with higher precipitation and deeper soils have a good potential for recovery and revegetation subsequent to disturbance.

Salt desert shrub community is confined to elevations between 4,500 and 6,000 feet. These communities are characterized by soils with high salt content and have a limited potential for vegetation production, recovery, and revegetation following disturbance.

Mountain shrub community is confined to the upper foothill zone and the lower edge of higher mountain topography. Elevation ranges between 6,000 and 9,000 feet. The mountain shrub type is typified by vegetative species that are important forage and cover for many wildlife species. Most mountain shrub communities are located on steep slopes within a broken topography; thus, the revegetation potential is limited.

Pinyon-juniper community is found between 5,000 and 7,800 feet in elevation. This vegetative type contains important cover and forage for many wildlife species. Large contiguous blocks of operable pinyon-juniper woodland pose a reclamation problem because of the long growing rotation (150 years). Stands of poor commercial value typically occur on more marginal soils and in areas of lower precipitation, which limits the revegetation and reclamation potential.

Conifer forest, predominantly ponderosa pine and Engelmann spruce-subalpine fir, constitutes five percent of the total land acreage in the Planning Area. Ponderosa pine, found from 7,800 feet to 9,000 feet in elevation, is a valuable timber resource and also important habitat for many wildlife species. Because it occurs on deeper soils and higher precipitation areas, the reclamation potential in ponderosa pine type is good. Spruce-fir occurs from 9,000 to 11,000 feet in elevation. However, the high elevation and difficult access limited the use of the forest type in the past, but it is presently emerging as one of the more important timber resources.

Alpine tundra communities provide important big game summer forage. They constitute four percent of the Planning Area and are found between 11,000 feet and 14,000 feet in elevation. Alpine tundra communities consist of many high altitude species of sedges, grasses, forbs, and shrubs. Many areas above timberline are steep, rocky, and essentially devoid of vegetation. Due to the high altitude, short growing season, and

TABLE 3-3. VEGETATION TYPES AND SUBTYPES--SAN JUAN/SAN MIGUEL PLANNING AREA

Type	Acreage (percent of total vegetation)	Subtype
Pinyon-juniper woodland	*599,800 (60)	Pinyon pine & juniper
Conifer forest	52,800 (5)	Ponderosa pine, Engelmann spruce-subalpine fir, & Douglas-fir
Sagebrush-grassland	181,800 (18)	Big & black sagebrush, winterfat, short, mid, and tall grass spp.
Salt desert shrub	88,400 (9)	Shadscale, mat & four-wing saltbush, & black greasewood
Mountain shrub	24,400 (3)	Oakbrush, mountain mahogany, service berry, willows, & bitterbrush
Alpine tundra	40,000 (4)	Sedges & high altitude grass spp. & forb spp.
Riparian	6,800 (1)	Sedges, rushes, willows, cottonwood alder, and birch
Total acreage	994,000	

*This figure includes 4,500 acres of aspen.

Source: BLM Data, 1989.

CHAPTER THREE

poorly developed soils, the reclamation potential in the alpine tundra type is seriously limited.

LIVESTOCK GRAZING

Livestock grazing is a widespread use of the public lands. Although most western Colorado ranchers obtain only a small proportion (20 percent or less) of their annual forage requirements from the public lands, these lands fill an important niche in their operations. Typically, public lands are used for spring and fall grazing. Ranchers winter their livestock on their private property and then move them onto public lands in the spring enroute to higher elevation National Forest lands where they graze during the summer. In fall, the livestock are moved back again onto public lands enroute to private land for the winter season. Some BLM lands are used for grazing in the summer and others are used as winter grazing. Use of public land is important because it allows ranchers a place to graze their livestock where they need to rest their privately-owned irrigated meadows for producing hay to be fed during the winter.

In northwest Colorado, the public lands are used mostly as winter sheep and cattle ranges. Sheep are usually moved to Forest Service permits after lambing on public lands, while cattle generally remain on summer BLM permits.

The following table displays the numbers of operators, animal unit months (AUMs), acres of public land grazed, and numbers of livestock grazed. The numbers of livestock are approximate and will vary considerably depending on length of seasons.

As indicated in Table 3-4, a significant amount of sheep use occurs within the GSR, LSRA, and SJ/SMPA. In these areas, public lands provide spring lambing

areas. These are areas where the livestock operator can distribute sheep herds in a manner conducive to lambing. These lambing areas range from 500 to 34,000 acres. In the LSRA, for example, there are about 440,000 acres used for lambing.

WILDLIFE

Habitat management emphasis is placed on fish and wildlife species as determined by their by legal status (special status species), esthetics, biological diversity, and commercial value that are of interest to the public and other federal and state agencies. BLM public land is essential in providing habitat requirements for over 650 species of fish and wildlife. For most wildlife species, specialized habitats are required for carrying out certain biological functions and if lost or altered, would adversely affect these species. These habitats are defined as crucial areas and are commonly referred to as winter ranges, birthing areas, migration routes, breeding grounds (leks), nesting, and roost sites.

Fish and wildlife information specific to a Resource Area is presented in Appendices K-M. Additional wildlife species' distribution maps can be reviewed at the Resource Area Office. These distribution maps are contained within the Wildlife Section of each Resource Management Plan prepared for that Resource Area administrated unit.

A list of special status animal species and their occurrence by Resource Area is shown in Table 3-5. Special status species include federally listed threatened and endangered species and other species of plants and animals of special concern (see Appendix P). Federal candidate species have no legal protection under the Endangered Species Act (ESA). In order to carry out the BLM's responsibilities of the ESA, it is our policy to avoid actions that may impact federally listed

TABLE 3-4. LIVESTOCK GRAZING

	Glenwood Springs	Kremmling	Little Snake	Northeast	San Juan/San Miguel
Acres of Public Land Grazed	516,000	355,798	1,317,000	5,308	937,000
Number of Operators	172	148	254	26	176
Total AUMs	56,885	42,395	166,895	936	64,233
Number of Livestock					
Cattle	12,889	30,000	17,000	90	13,328
Sheep	9,326	200	95,000	0	12,847
Horses	7	70	990	0	161

AFFECTED ENVIRONMENT

TABLE 3-5. A LIST OF FEDERAL SPECIAL STATUS ANIMAL SPECIES AND COMMON OCCURRENCE AMONG THE FIVE RESOURCE/PLANNING AREAS

COMMON NAME	SCIENTIFIC NAME	STATUS	OCCURRENCE
Bald eagle	<u>Haliaeetus leucocephalus</u>	FE,S	All
Peregrine falcon	<u>Falco peregrinus</u>	FE,S	All
Black-footed ferret	<u>Mustela nigripes</u>	FE	Unknown
Colorado squawfish	<u>Ptychocheilus lucius</u>	FE,S	KRA,LSRA
Humpback chub	<u>Gila cypha</u>	FE,S	KRA,LSRA
Bonytail chub	<u>Gila elegans</u>	FE,S	KRA,LSRA
Razorback sucker	<u>Xyrauchen texanus</u>	FC,S	GSRA,LSRA
Colorado cutthroat trout	<u>Salmo clarki pleuriticus</u>	FC,S	GSRA,KRA
Boreal western toad	<u>Bufo boreas boreas</u>	FC	KRA,SJ/SMMPA
White-face ibis	<u>Plegadis chihi</u>	FC	KRA,NPA,SJ/SMMPA
River otter	<u>Lutra canadensis sonora</u>	FC,S	SJ/SMMPA
North American lynx	<u>Felis lynx canadensis</u>	FC,S	KRA,SJ/SMMPA
North American wolverine	<u>Gulo gulo luscus</u>	FC,S	KRA,SJ/SMMPA
Preble's meadow jumping mouse	<u>Zapus hudsonius preblei</u>	FC	NPA
Mountain plover	<u>Charadrius montanus</u>	FC	NPA
Long-billed curlew	<u>Numenius americana</u>	FC	NPA,SJ/SMMPA
Colorado burrowing mayfly	<u>Ephemera compar</u>	FC	NPA
Lost Ethmid moth	<u>Ethmia monachella</u>	FC	NPA
Regal fritillary butterfly	<u>Speyeria idalia</u>	FC	NPA
Southwestern willow ayacatcher	<u>Empidonax traillii</u>	FC	SJ/SMMPA
Texas horned lizard	<u>Phrynosoma cornutum</u>	FC	SJ/SMMPA
Swift fox	<u>Vulpes velox</u>	FC	KRA, SJ/SMMPA
Stevens' tortricid moth	<u>Decodes stevensi</u>	FC	NPA
Mexican spotted owl	<u>Strix occidentalis lucida</u>	PL	SJ/SMMPA
Ferruginous hawk	<u>Buteo regalis</u>	FC	KRA,LSRA,NPA,SJ/SMMPA
Greater sandhill crane	<u>Grus canadensis tabida</u>	S	LSRA

FE = Federally endangered species

FC = Federal candidate species

PL = Proposed for listing

FT = Federally threatened species

S = State listed species

All = All five Resource/Planning Areas.

candidate species and state listed species contributing to the need for future listing of a species as threatened or endangered.

Glenwood Springs Resource Area

Big Game

Mule deer and elk are the most common big game species in the area. BLM public lands in the Resource Area supports a significant portion of the wintering population of mule deer and elk. Approximately 400,000 acres of deer winter range is on public land of which 208,000 acres is considered to be crucial winter habitat. In the Castle Peak and Eagle-Vail areas, a major migration route is classified as crucial habitat. Approximately

3,500 mule deer migrate from summer range in the Gore Mountain Range to winter range in the Gypsum and Eagle areas.

Elk populations have increased from the early 1960s to 1987. There was an overall increase of 128 percent in the last 30 years. Estimated elk winter range on the public land is 304,000 acres of which 155,000 acres is considered crucial winter habitat.

Rocky Mountain bighorn sheep reintroduction began in 1975 and currently, 26,000 acres of public lands are occupied by bighorn sheep or is considered as potential habitat.

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Birds

Sage grouse can be found near Debeque, in mouth of Eagle County, and in southern Routt County. The majority of the population in Eagle County is totally dependent on public lands for all of their habitat requirements. The most crucial habitats are the wintering, strutting (leks) and brood rearing habitats. Limiting factors to the population are a loss/declining condition of the winter and brood rearing habitat.

Waterfowl are primarily found in wetland areas. Most wetland occur as river bottoms, resulting in waterfowl populations being closely associated with riverine systems.

The more common raptors that breed and nest in the area are prairie falcons, red-tailed hawks, northern harriers, and golden eagles. Precipitous rock formations, large trees, and mountain meadows provide suitable nesting habitat for these species. The numerous songbirds and small mammal populations provide the prey base available to these raptors. Woodland nesting species such as goshawks, Coopers hawks, and sharp-shinned hawks are common in the forested area. For these various raptor species, 214 nest sites have been documented in the Resource Area.

Aquatic Habitat

Aquatic and riparian habitat of portions of 56 streams (totaling 126 miles) and five lakes occur on public land and support a fishery resource. In addition, six streams (5.1 miles of public land frontage) that do not presently support a fishery have potential for introducing a fishery. The most productive fisheries occur in the Colorado, Roaring Fork, Eagle, Fryingpan, Piney, and Crystal Rivers, which make up about 32 percent of the total public land stream frontage providing an existing fishery. A relatively minor amount of the total miles of rivers and streams in the Resource Area occurs on public land. Most streams tributary to the major rivers sustain a self-perpetuating fishery or are stocked regularly by the Colorado Division of Wildlife.

Special Status Species

The bald eagle, a federally listed species are common throughout the winter months.

Three historic bald eagle nests are located in the Resource Area, two of which occur on public land. Several sightings of peregrine falcons have been reported in the past; however, no active nests are known at this time. A number of known historic nest sites exist in the Resource Area, and several potential nesting sites for peregrine falcon introduction have been identified on public land.

Six of the known active heron nest sites in Colorado occur along the Colorado River within the Resource Area, with a majority of this use occurring from New Castle west to the Resource Area boundary.

Historically, the squawfish, humpback chub, and bony-tailed chub were thought to inhabit the Colorado River as far east as Rifle. Presently, none of these species are thought to occur in the Resource Area. All three species are listed as both federal and state endangered species. The razorback sucker, although once inhabiting the Colorado River as far east as Rifle, is thought now to occur only as far east as Rulison. This species is classified federally as a candidate species and as endangered by the state. The Colorado River cutthroat trout, once listed as threatened by the state is now classified federally as a candidate and as a State Species of Special Concern. Current information indicates that this species is located in nine streams and one lake on public land in the Resource Area. Appendix K, Table K-1, lists the streams and stream mileage on public lands where the Colorado River cutthroat trout occurs, the year sampled, and the rating.

Kremmling Resource Area

Big Game

Mule deer, pronghorn antelope, and elk are the most common large mammals found in the area. Mule deer and elk occupy higher elevations, usually forested habitat, during summer and then migrate to lower elevation sagebrush dominant ridges and slopes to winter. BLM public lands provide the vast majority of winter range available to deer and elk in the Resource Area. Pronghorn antelope are found in North Park (including the Laramie River drainage) and in portions of Middle Park.

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Winter ranges for elk, mule deer, and pronghorn antelope are crucial in maintaining wintering populations and are located on sagebrush dominant ridges and south-facing slopes at lower elevations throughout the Resource Area.

Birds

Upland game birds common to the Resource Area include blue grouse and sage grouse. Blue grouse are widely distributed throughout the higher elevation woodlands and mountain meadows. Sage grouse occupy the lower elevation sagebrush-dominant rangelands throughout the Resource Area. Sage grouse depend almost entirely on the sagebrush ecosystem for successful breeding, nesting, and winter survival. The North Park sage grouse population has been extensively studied for the past ten years. The breeding and courtship areas are called leks and have been found to be essential in maintaining sage grouse populations. There are approximately 40 known leks in the Resource Area on public lands. The majority of the leks occur in North Park. Associated within a two-mile radius of these leks are important nesting areas (Schoenberg 1982).

The numerous streams, rivers, reservoirs, ponds, and associated riparian vegetation provide excellent habitat for a wide variety of waterfowl and shorebirds. Puddle ducks, including mallards, pintail, gadwall, greenwinged teal, and American widgeon, are common throughout the aquatic habitats in the Resource Area. North Park is particularly important because its waterfowl production is the second highest of any area in Colorado. Shorebirds are common in association with the numerous water bodies. Greater sandhill cranes known to nest in the southwest quadrant of North Park. Killdeer, American avocets, willets, and Wilson's phalaropes are among the more common shorebirds found.

Common raptors are prairie falcons, red-tailed hawks, northern harriers, and golden eagles that breed and nest in the area. Precipitous rock formations, large trees, and mountain meadows provide suitable nesting habitat for these species. The numerous songbirds and small mammal populations provide the prey base available to these raptors. Woodland nesting species such as

goshawks, Coopers hawks, and sharp-shinned hawks are common in the forested areas.

Aquatic Habitat

The fishery resource in both streams and lakes contain naturally reproducing populations of game fish. Limited fish stocking occurs in reservoirs by the Colorado Division of Wildlife. Major fish species are rainbows, cutthroat, and brook trout with a lesser number of brown trout.

Special Status Species

The bald eagle, an endangered species, is a fairly common winter resident along the Colorado River and several major tributaries in Middle Park. Migrant bald eagles are observed annually in North Park and occasionally in the Laramie River drainage. Peregrine falcons are observed in migration in Middle Park and North Park; however, no established use has been recorded even though apparent suitable habitat exists. Crucial habitats for bald eagles and peregrine falcons are not known to occur in the Resource Area. The Colorado squawfish, humpback chub, and bonytail chub may occur in the Resource Area; however, these threatened and endangered species have not been recently recorded. Federal candidate species that may occur are the Colorado cutthroat trout, Boreal western toad, white-faced ibis, and ferruginous hawk.

Little Snake Resource Area

Big Game

The primary big game species in the Resource Area are elk, mule deer, and pronghorn antelope. Most elk populations within the area are migratory. Summer ranges occur at the higher elevations in the aspen and conifer habitat types of the Cold Spring and Douglas Mountain area and in the Routt and White River National Forests. In the fall, elk move to the lower elevations occupying mountain shrub and sagebrush wintering habitats. Small resident elk herds occur on Cold Spring Mountain and in the Middle Mountain-Diamond Peak area. Crucial winter ranges for elk are located south and west of Craig in Williams Fork Mountains and Williams Fork River drainage and extend westward along the Yampa River,

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including Iles and Duffy Mountains and Axial Basin. Northeast of Craig, elk severe winter range extends from the Battle Mountain-Slater area westward to Fourmile Creek and south to Fortification Creek and Cottonwood Gulch.

Mule deer are common in nearly all habitat types. Many migrate between aspen/conifer summer ranges and sagebrush/mountain shrub winter ranges. Some occupy shrub lands year-round. The majority of public land in the Resource Area is considered to be wintering habitat for mule deer because of snow depths that limit forage availability. Crucial deer winter ranges are located along the lower Williams Fork drainage and the Yampa River drainage, from its confluence with Williams Fork to the Little Snake River, including Isles Mountain, Duffy Mountain, Little Yampa Canyon, Axial Basin, the foothills of Juniper Mountain, and Cross Mountain. The range continues up the east side of the Little Snake River and incorporates Godiva Rim and the northern Great Divide area and lower Scandinavian Gulch. Another crucial winter range is located in the Big Gulch-Cottonwood Gulch and Fortification Creek area northeast of Craig.

Pronghorn antelope are common year-round throughout the lower elevation habitats that consist primarily of sagebrush, saltbush, and greasewood. Some herds are migratory and move to winter concentration areas. Movement patterns may be influenced and altered by man-made barriers such as fences, roads, and canals. Crucial winter range includes much of the Sand Wash area and along the entire length of the Little Snake River within about two to five miles on either side of the river channel. It also extends to the lower Fourmile Creek and West Timberlake Creek drainages.

Birds

Upland game bird species include sage grouse, sharp-tailed grouse, blue grouse, and chukar partridge. Sage grouse occur throughout the sagebrush habitat and are dependent on sagebrush for food and cover. The large contiguous stands of sagebrush contains the largest population of sage grouse in Colorado. Sage grouse concentrate on strutting grounds or leks which they use annually for mating displays. Strutting

grounds, wintering areas, and nesting and brooding areas are crucial to population survival. There are 126 total known strutting grounds in the Resource Area of which 38 are on public land. Most nesting activity takes place within a two mile radius of the lek making such areas biologically important for sage grouse.

Sharp-tailed grouse occur in the eastern one-third of the Resource Area and are frequently associated with agricultural land. Like sage grouse, sharp-tailed grouse breeding, nesting, and brood rearing are associated with leks or dancing grounds. There are 31 known leks on public lands within the Resource Area

Excellent habitat for raptors exist because of the low human densities coupled with quality nesting habitats and abundant prey species. The northwestern corner of the Resource Area north of the Yampa River and west of the Little Snake River contains considerable high quality habitat, however, less than ten percent of the area has been formally surveyed. Currently, 1,201 raptor nests have been documented. Most common raptor species are golden eagle, ferruginous hawk, red-tail hawk, prairie falcon and several species of owls.

Aquatic Habitat

There are about 150 miles of perennial streams and rivers that include the Yampa, Williams Fork, and Little Snake Rivers, and Beaver, Willow, Talamantes, and Vermillion Creeks. Game fish are limited primarily to the Yampa River, which supports catfish, pike, and brown trout; and Beaver Creek, which contains brown, brook, and cutthroat trout. The Yampa River ranges from poor to average in fisheries quality in the Resource Area according to the Colorado Division of Wildlife stream rating (Sealing 1981). Beaver Creek is considered above average and is one of the few natural trout fisheries in the Resource Area. Riparian communities, although limited in quantity and quality, provide habitat for a large number of wildlife species and represent a highly important resource within the Resource Area.

Special Status Species

The bald eagle, American peregrine falcon, Colorado squawfish and humpback chub are

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the known federally listed threatened and endangered to occur on public land.

The Yampa and Little Snake Rivers provide habitat for the Colorado squawfish and humpback chub. The razorback sucker, which is listed by the state of Colorado as threatened and is proposed for federal listing as endangered, is known to occur in the lower 13 miles of the Yampa River (Tyus and Karp 1989). The Colorado squawfish is distributed in the mainstream Yampa River from its mouth upstream to Craig, Colorado, and approximately 14 miles up the Little Snake River. In the summer of 1990, however, one adult squawfish was found in the Little Snake River in Wyoming just downstream from the town of Baggs (H. Tyus, personal communication). Humpback chubs are found in canyon-bound habitats in the lower 56 miles of the Yampa River, which includes Cross Mountain Canyon, and in the lower 10 miles of the Little Snake River.

The black-footed ferret, an endangered species, is often reported as being sighted, however these sightings have not been confirmed. The abundance of prairie dog colonies in the western portion of the Resource Area is potential habitat for the reintroduction of the black-footed ferret. Current habitat suitability studies and evaluations are being conducted for the potential reintroduction of the black-footed ferret by BLM, Colorado Division of Wildlife, and U.S. Fish and Wildlife Service.

The bald eagle is a winter resident and occasionally breeds within the Resource Area. Currently, two bald eagle nests are known to be active. Winter roost sites are located along the Little Snake, Yampa, and Williams Fork Rivers in the riparian cottonwood trees. A total of 17 documented roost sites are located along the Yampa River from just below its confluence with the Williams Fork River downstream to about the town of Sunbeam. Sites are located on BLM, National Park Service, and private lands.

The American peregrine falcon is known to nest within Dinosaur National Monument and Cross Mountain. One active eyrie has been occupied every year since it was documented in 1987.

Crucial habitat for a state listed endangered bird, the greater sandhill crane, occurs in Routt and Moffat Counties. This bird nests along willow lined drainages in the riparian habitat. Approximately 700 acres of BLM land along Willow Creek and Red Creek, south of Steamboat Lake in northeastern Routt County, is crucial habitat for feeding, dancing, and nesting activities of the sandhill crane.

Northeast Planning Area

Big Game

Mule deer, white-tailed deer, pronghorn antelope, elk, and Rocky Mountain bighorn sheep are the most common big game species found on public land. Crucial winter range for mule deer as well as winter range for elk occurs along the Front Range.

Birds

The large irrigation reservoirs along the South Platte River are important for many nongame bird species including white pelicans, great blue herons, double crested cormorants, snowy egrets, cattle egrets, and black-crowned night herons. Common raptor species are golden eagles, Swainson's hawks, red-tailed hawks, marsh hawks, and in the winter, rough-legged hawks.

Aquatic Habitat

Several plains reservoirs contain a cold and warm water fisheries. The major species are bass, walleye, catfish, perch, and crappie. Several streams along the Front Range support cold water fisheries. The major species are brook, brown, and rainbow trout. The major waterways going through public land are Clear Creek, Bard Creek, Mill Creek, Fall River, Deer Creek, South Boulder Creek, and Left Hand Creek.

Special Status Species

Two federally listed endangered species, the bald eagle and peregrine falcon, are known to migrate through the Resource Area.

The South Platte River drainage and associated reservoirs are crucial winter habitat area for bald eagles. The mid-winter survey along the South Platte River drainage usually results in observing between 60 and 80 bald eagles. Potential peregrine falcon eyrie sites

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occur along the Front Range. Cathedral Spires, a currently unoccupied historical eyrie, occurs on public land along the North Fork of the South Platte River.

Two state threatened fish, the orangethroat darter and the Arkansas darter, occur in the Resource Area. The Arkansas darter is found in Big Sandy Creek, and the orangethroat darter in the Republican and Arikaree Rivers. The greater prairie chicken, a state endangered species, inhabits areas in Yuma and Logan Counties that are subject to leasing of federal mineral estate.

San Juan/San Miguel Planning Area

Big Game

Mule deer and elk are found as year-round residents on public land with large wintering concentration of deer and elk in the northwest portion of the Resource Area. Both species tend to migrate between forested lands at higher elevations in the spring and summer to woodlands at lower elevations in the fall and winter. Average herd densities are relatively low in summer (two-three deer/square mile) due to the large amount of available habitat. Winter herd densities may exceed 200 deer per square mile on some crucial winter ranges because snow depths limit habitat availability. Migration between winter and summer ranges may exceed 50 miles in this region.

Birds

Sage and blue grouse, chukar, quail, wild turkey, ptarmigan, and pheasant are present in small numbers and scattered throughout the Resource Area. Pheasants are mainly dependent on nearby agricultural land, while the others are associated with native rangeland, alpine, and forest type habitats. Sage grouse leks and nesting habitat have been identified in the vicinities of Dry Creek Basin and Miramonte Reservoir.

Aquatic Habitat

There are an estimated 500 miles of stream habitat on public lands. The Dolores River has an estimated 120 miles of aquatic and riparian habitat, San Miguel River has 25 miles, and the Animas River nearly 16 miles of aquatic resources. The remaining miles of stream habitat are principally those tributaries

associated with these three major drainages. The current aquatic habitat condition ratings for 144 miles of stream habitat are shown in Table M-2, Appendix M. The major game species observed in the streams was rainbow trout. Some of the streams also contained brook, brown, and cutthroat trout. Other species included suckers, shiners, cottids, and some species that remain unidentified.

Special Status Species

Bald eagles, federally listed endangered species, have historically nested along the rivers in the Resource Area. The impoundment of rivers and development of storage reservoirs has created additional nesting habitat. Two nest sites have been identified on public lands, but potential habitat exists in several areas (near Vallecito and Lemon reservoirs northeast of Durango and near Summit Lake, north of Mancos). Most bald eagle activity on public land occurs from November through April when birds from northern states migrate into the area. The largest concentration of bald eagles are in the Disappointment Valley and Dry Creek Basin. Communal roosts are found in the San Miguel River canyon.

The American peregrine falcon, a federally listed endangered species, is common to the Resource Area. At least eight nesting sites are known. Two of these sites have ongoing falcon reintroduction programs and a third site is under consideration for possible reintroduction efforts (Chimney Rock, Durango, and Mesa Verde sites) (Langlois 1983).

The extreme eastern portion of the Resource Area and most of the Silverton area are included in the migration route of the Grays Lake whooping crane flock along with the greater sandhill cranes. The sandhill cranes are being used to foster whooping cranes in an experimental program to assist the recovery of the whooping crane species. Greater sandhill cranes, a Colorado endangered species, once nested in the Silverton Planning Area in willow-lined drainages and meadows up to 9,500-foot elevation. Occupied nesting ranges have been reduced to the northwestern part of the state.

Mexican spotted owls have been reported to occur at Mesa Verde in ponderosa pine and

Douglas-fir habitat (G. Craig, CDOW, personal communication 1983). Similar habitat sites occur on Weber and Menefee mountains, in the Dolores River Canyon, and near Durango. Limited inventories have been conducted for this species in the Resource Area.

River otters, federal candidate species, were known to have occurred in the Dolores and San Miguel River drainages. River otters have been introduced to the Piedra River and the Dolores River by the Colorado Division of Wildlife.

WILD HORSES

LSRA and SJ/SMPA are the only two areas that contain wild horses.

The LSRA currently manages a wild horse herd, amounting to several bands within the Sand Wash Basin. The herd level objective is to control and maintain approximately 160 horses. The herd management area is predominantly public lands. A total of 157,630 acres are included in the area, of which 154,940 acres are public lands (see Map L-1, Appendix L). The herd consisted of 279 horses in March of 1988, which were in small bands of five to 20 horses, located throughout the basin. Historically the annual horse numbers have fluctuated to a large extent. The census data in Table L-2 (Appendix L) has been gathered since 1971.

Wild horses are found in the SJ/SMPA at the southeast end of Disappointment Valley in Spring Creek Basin (see Map M-3., Appendix M) which contains 35,000 acres, of which 27,000 acres (77 percent) are public lands. The herd has steadily increased from 24 head in 1971 to 65 head in 1989. One hundred-twenty head were gathered in the Spring Creek Basin area in 1985. The area was then restocked with 35 head. Currently there are approximately 80 head in the Spring Creek Basin area. Management goal for this area is an average herd size of 50 head.

SOILS

The soils in the Study Area are highly variable in texture, depth, fertility, and age. Young soils are found in drainage ways where deposition occurs and on unstable slopes where erosion is taking place. Older soils occur on stable uplands and in higher

precipitation areas reflected by increased vegetative cover. Texture varies from fine clays, which are generally high in salts, to coarse sands, which may be wind deposited. Depth varies from shallow soils (a few inches), as on ridges and steep side slopes, to deep soils (greater than 60 inches), as found in alluvial drainages. Soil fertility may be reflected by the vegetative cover. Those with a sparse vegetative cover are not considered to be fertile soils, and the soil building processes are very slow. Those with a dense vegetative cover reflect higher fertility and faster soil building processes.

The spring thaw is when the soils are most susceptible to damage from vehicle travel or construction activities. Activities during this period could cause problems in the reclamation of a disturbed area. Increases in erosion and sedimentation are more likely during the spring thaw and periods of high runoff.

Steep, infertile and high salt content soils are classified as fragile soils. Major areas of fragile soils have been identified in the LSRA. These areas include the Danforth Hills, side slopes along drainage ways in the Vermillion Creek, Sand Wash, and the Little Snake River watersheds, and badlands throughout the Resource Area. Examples of what may happen when fragile soils are disturbed can be observed in the Danforth Hills area, where massive landsliding has occurred on side slopes associated with drill pads and access roads.

Several potential prime farmland sites exist within the Study Area. These areas exhibit very high soil productivity potential and are eligible for special designation and protection. Special stipulations on surface-disturbing activities are used to prevent any unnecessary disturbance.

WATER

The Study Area encompasses portions of the following river basins: Colorado, North Platte, South Platte, and Green. Average annual precipitation over these basins range from 30 inches in some mountainous areas to less than 12 inches at lower elevations. Water yields range from 0.1 inch of runoff to a high of over 20 inches. The average from public lands is two inches or less. Peak flow on the main tributaries typically occurs in

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May and June due to spring snowmelt. Intense summer thunderstorms result in peak flows on small tributaries and cause locally severe flooding and debris flow.

Water quality is most often affected by the geologic formations that contribute significantly to the salinity of several basins. The most notable is the Colorado River Basin. Sedimentary rocks, such as the Mancos Shale, Eagle Valley Evaporite, and Green River, contain highly soluble minerals that are easily leached by water passing over or through them. Water quality measurements by the BLM indicate salinities (TDS) as high as 2,500 milligrams per liter (mg/l). This is five times the recommended drinking water standard of 500 mg/l. Values up to 1,000 mg/l have been found to be harmless for human consumption. Salinity problems occur throughout the Study Area except for the KRA. In the KRA, many of the BLM lands are near the headwaters. The headwaters flow over insoluble geologic formations and have low salinity. There are limited areas where saline springs and soluble geologic formations contribute to salinity problems.

Sediment yield can vary from a low of less than 1/4 ton/acre/year to a high of 8.4 tons/acre/year. The overall average is probably one ton/acre/year. Erosion is more severe where ground cover is sparse.

Several critical watersheds are within the GSRA. These are the municipal watersheds for the cities of Rifle and New Castle. A flow hazard zone around Glenwood Springs is the other critical watershed. These areas require special stipulations on any surface-disturbing activity.

Most public land watersheds provide important groundwater recharge and discharge areas. These areas contribute significantly to baseflow to the local streams and river. The majority of the groundwater resources have not been developed. Some development has occurred by municipalities and agricultural interest.

Groundwater salinity is generally higher than surface water because it moves slower and is in contact with soluble minerals much longer. As an example, the Eagle River (GSRA) received 34 percent of its annual discharge from groundwater inflow and 58 percent of its salt load from that same groundwater

inflow. Ranchers and farmers also use groundwater for both domestic and agricultural use.

The NPA has two major groundwater regions: the South Platte River Basin and the Northern High Plains. The South Platte River Basin is comprised of two very dissimilar regions: the high, rugged mountainous headwaters to the west and the low precipitation plains to the east. The Northern High Plains of extreme eastern Colorado are dissimilar to most of the water basins in Colorado in that no streams or rivers which cross it begin in the mountains. The two river systems which drain the area, Republican-Arkansas and the Smokey Hill, leave their headwaters located approximately 70 miles east of the mountains. The relative lack of surface water availability in these two regions and the abundance of the groundwater resources has resulted in extensive development of this resource throughout the area.

It has been estimated that upwards of 130 million acre feet of recoverable groundwater can be expected within the South Platte River Basin. However, due to the large size and varying structural conditions found within the basin, the amounts of water yielded from any one aquifer can vary considerably within short distances.

The principle aquifer underlying the Northern High Plains is the Ogallala. It has about 80 million acre-feet of recoverable groundwater. The water is generally suitable for domestic and irrigation purposes with concentrations of dissolved solids ranging from 100 to 500 mg/l.

FORESTRY

Each Resource/Planning Area supports small but active forestry programs. Both sawtimber and firewood sales are made in each area, except in the NPA where only commercial and family firewood are sold. The following describes the forest resources in each area.

Glenwood Springs Resource Area

The GSRA has approximately 45,640 acres of productive forest land that supports Engelmann spruce-subalpine fir (49 percent),

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lodgepole pine (38 percent), Douglas-fir (11 percent), aspen (11 percent), ponderosa pine (two percent), and subalpine (one percent).

The forest, in general, is healthy with the majority of stands in a mature or over mature condition. The Resource Area also supports approximately 214,310 acres of pinyon pine (44 percent) and juniper (44 percent), considered to be woodlands. An estimated 75 acres of pinyon pine and juniper are harvested annually. Annual woodland harvest averages 1,000 cords of commercial fuel wood and 500 cords of fuel wood sold under public-use permits. The pinyon-juniper forest is typified by stands of all ages and conditions but is generally exemplified by slow-growing mature stands.

Kremmling Resource Area

In the KRA, the three major forest types are lodgepole pine, aspen, and pinyon-juniper. Lodgepole pine is found throughout most of the mountainous slopes between 8,000 and 10,000 feet. It is the most important and intensively-managed productive forest type. Four other coniferous forest types that occur in scattered pockets throughout the Resource Area are the spruce-fir, Douglas fir, ponderosa pine, and limber pine. Each of these types accounts for less than one percent of the total vegetative cover, and therefore, are not intensively managed.

Stands of quaking aspen are found on mountain slopes at nearly all elevations and under a wide range of conditions. Aspen stands have largely been maintained and preserved for their scenic, recreational, wildlife, and grazing values. However, a waferboard factory, built in Kremmling in 1983, utilizes aspen trees that generally average larger than eight inches in diameter at breast height. The pinyon-juniper vegetative type is almost exclusively confined to the drier, warmer foothills in the southwest part of the Resource Area. Commercial pinyon-juniper trees are used for firewood and fence posts.

Little Snake Resource Area

In the LSRA, four major forest or woodland types occupy a total of 160,420 acres. These include pinyon-juniper woodlands, ponderosa pine, lodgepole pine, and aspen.

Pinyon-juniper woodland is the dominant forest type, occurring on approximately 127,730 acres in the western portion of the Resource Area. Current use of this type is for commercial and noncommercial harvest of fuel wood, fence posts, and poles.

Lodgepole pine occurs on approximately 6,800 acres. The largest concentrations of lodgepole are found adjacent to the Routt National Forest on the east side of the Resource Area and in the Diamond Peak-Middle Mountain area in the northwest corner of the Resource Area. Much of the commercial sized lodgepole is infected with mountain pine beetle and dwarf mistletoe, causing heavy mortality in sawtimber stands and dramatic growth reduction in post/pole size classes. Current use of this type is for commercial and noncommercial harvest of house logs, fuel wood, posts, and poles.

Isolated remnant stands of ponderosa pine occur on about 11,590 acres of Douglas Mountain in the southwest portion of the Resource Area. The average age of most of the sawtimber-size ponderosa is in excess of 250 years. This old age, coupled with mountain pine beetle infestation, is responsible for the present high rate of mortality of the species. Current uses include commercial harvest for sawlogs and fuel wood and noncommercial harvest of fuel wood. Aspen occurs in pure stands or mixed with lodgepole pine at elevations above 7,000 feet, and occupies approximately 14,300 acres. Current use of aspen is for noncommercial harvest of fuel wood.

Northeast Planning Area

Forested lands in the NPA are found along the Front Range. The predominate tree species are ponderosa pine, Douglas fir, and lodgepole pine, with limber pine, sub-alpine fir, and Englemann spruce also occurring. Timber sales are small and well defined. Most of the wood is used for firewood, with about half being cut by individuals for personal use.

San Juan/San Miguel Planning Area

The SJ/SMPA contains 44,200 acres of commercial forest base with the predominant commercial species being ponderosa pine, Englemann spruce, and Douglas-fir (see

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TABLE 3-6. SPECIAL RECREATION MANAGEMENT AREAS

Location	Name	Size (acres)	Annual Visitor Days	Major Activities/Features/Sites
Glenwood Springs	Upper Colorado River	13,144	8,540	Whitewater boating/ Spectacular canyons/Fishing
	Bull Gulch	9,900	710	Hiking/Wildlife viewing
	Hack Lake	3,100	1,390	Fishing/Hiking
	Deep Creek	2,400	1,870	Hiking/Caving/Fishing
	Eagle River	1,800	15,465	Fishing/Whitewater boating
	Thompson Creek	4,300	1,070	Hiking/Wildlife viewing/ Nature study
Kremmling	Upper Colorado River	4,870	36,375	Whitewater boating/ Spectacular canyons/ Developed campground/Fishing
	North Sand Hills	700	3,670	Off-highway vehicles/Sand dunes/Cultural resources
Little Snake	Upper Yampa River	19,800	7,150	Fishing/Flatwater boating/ Waterfowl viewing
San Juan/San Miguel	Anasazi	156,000	12,620	Viewing cultural ruins/Off-highway vehicles
	Alpine Triangle	54,000	118,825	Off-highway vehicles/Alpine scenery/ Historic ruins/ Camping/ Hiking
	Dolores River	22,464	11,720	Whitewater boating/ Fishing/ Camping/ Spectacular canyons

Source: Recreation Information Management System (RIMS).

Map M-4, Appendix M). An estimated 9,540 acres or 22 percent of all the commercial forest base within the Planning Area are available for timber production. The remaining 34,660 acres are considered unsuitable because of extreme topography, fragile soils, and recreational withdrawals.

Woodland species presently occupy approximately 600,000 acres of the SJ/SMPA. Approximately 67,000 acres of the woodland forests could be classified as productive, operable, and capable of being intensively managed. Under current management, no woodland acres are identified as being under intensive management. Most woodland activities have been implemented with an objective to improve range conditions. The demand for woodland products within the Planning Area has been estimated at 1,000 cords of fuel wood and 3,000 posts annually.

RECREATION

Throughout the Study Area, outdoor recreation is an important component of local economies (see Social and Economic section). Public lands and lands overlying federal mineral ownership provide an important resource for a wide variety of

recreational activities. Some of the more significant activities that may be impacted by oil and gas development are discussed. Throughout the Study Area, demand for recreational opportunities is expected to increase.

The BLM manages two types of recreational situations on public lands. Most of the public lands are managed to maintain a freedom of recreational choice with a minimum of regulatory constraints. There are few BLM recreational facilities or supervisory efforts on these lands. These areas are sometimes referred to as Extensive Recreation Management Areas (ERMAs). Where the nature of the resource attracts intensive recreational use, public lands may be managed as a Special Recreation Management Area (SRMA). These are areas where BLM makes major investments in recreational facilities and visitor assistance. Specific management direction in a SRMA is formulated by the BLM to provide for resource protection and public health, safety, and enjoyment. SRMAs within the Study Area are listed in Table 3-6.

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Glenwood Springs Resource Area

The GSRA, in addition to the SRMAs shown on Map K-10 (Appendix K) and described in Table 3-6, provides a variety of outdoor recreational opportunities and settings. This area is becoming increasingly well known for its many caves. Also, within the area are several destination resorts including Vail, Aspen, Snowmass, and Glenwood Springs which add to the recreational character and to the demand on public lands as well. State and local parks sometimes occur on lands overlying federal mineral ownership. An example of this occurs at Rifle Mountain Park. This 400-acre park receives heavy use by local residents for community gatherings, camping, hiking, and fishing.

Kremmling Resource Area

The KRA contains an abundance of outdoor recreational opportunities. Major attractions include Rocky Mountain National Park, Arapaho National Recreation Area, several national forest wilderness areas, several major reservoirs, and the upper Colorado River. With the exception of the upper Colorado River and North Sand Hills, the major recreational features are located on lands managed by agencies other than BLM. The BLM-managed lands do play a significant supplemental role in the regional recreational setting.

In North Park, the BLM-administered lands comprise a majority of the basin and are mostly rolling, open sage country useful for dispersed recreation. In Middle Park, the BLM-administered lands are usually adjacent to national forest, except around Kremmling and along the Colorado River, and provide both access and "spill over" room for the more heavily-used areas. In addition, these public lands provide opportunities for activities such as rockhounding, off-highway vehicle (OHV) use, and wildlife viewing and hunting.

Little Snake Resource Area

The public lands within the LSRA boundaries provide significant recreational opportunities and supplement the other better known federal agency lands such as Dinosaur National Monument, the Routt National Forest, and Browns Park National Wildlife Refuge, which all provide for a variety of

recreational activities in a variety of environmental settings. Parts of the Mount Zirkel and Flat Tops Wilderness Areas lie within the area and provide undeveloped, primitive types of recreational experiences. The Steamboat Springs ski area and Steamboat Lake State Park, on the other hand, provide developed recreational areas with intensive use, as do the various towns within the Resource Area.

The BLM-administered lands generally add another dimension to the recreational opportunities available by providing unrestricted settings for a variety of dispersed recreational activities. Activities now occurring on the public lands include hunting, camping, floatboating, rockhounding/collecting, picnicking, fishing, hiking, backpacking, horseback riding, nature study, viewing wildlife, viewing cultural/historical sights, sightseeing, photography, snowmobiling, cross-country skiing, and OHV use, among others. The Yampa River has been proposed for Wild and Scenic River study.

Hunting is currently the dominant recreational activity on the public lands throughout the Resource Area. It attracts people from around the nation, giving this area national significance. Big game hunting (deer, elk, antelope) and sage grouse hunting make up the majority of use on public lands. Small game hunting (rabbit, other upland game birds, varmints, etc.) accounts for only 20 to 30 percent of the total hunting use.

Northeast Planning Area

The NPA includes the most populated area of Colorado; however, the small quantity of public land and the scattered nature of the tracts have resulted in little dependence on BLM for recreation. Some scattered tracts of public lands are being transferred to local governments for recreational use. Because of its proximity to population centers along the Front Range, heavy recreational use is made of open space and park lands managed by state, county, and local governments. Many of these park lands contain federally-owned minerals or contain areas of federal land leased under provisions of the Recreation and Public Purpose (R&PP) Act. In either case, BLM may analyze their suitability for oil and gas leasing. Examples of such park lands include Golden Gate Canyon State Park, the

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city of Boulder, and Boulder County-managed open space, and Denver Mountain Parks.

San Juan/San Miguel Planning Area

Within the SJ/SMPA, the Dolores River, from McPhee Dam to Bedrock (104 miles) has become one of the more popular boating rivers in the Southwest. In 1976, most of this river segment was recommended as suitable for Wild and Scenic River designation (33 miles classified as wild, 20 miles scenic, and 41 miles recreational), however, Congress has not yet acted.

Also the Animas River (from Silverton to Ruby Creek) is on the Nationwide Rivers inventory of potential wild, scenic, and recreational rivers, and the Animas River Valley has been identified as a potential National Natural Landmark.

The Alpine Triangle SRMA is unique because it provides a full range of recreation setting opportunities (from primitive to urban), with an equally wide distribution and public availability for activities such as wilderness recreation, jeeping, mountain climbing, backpacking, cross country skiing, historic and geologic interpretation, fishing, hunting, and scenic viewing on an area unparalleled in all of BLM's public lands. SRMAs within the Planning Area are display on Map M-5 Appendix M).

The remainder of the Planning Area provides dispersed, unstructured recreational use and opportunities. Significant public funds have been invested in the Dolores Overlook, Anasazi Heritage Center, and Lowry Ruin. These BLM facilities receive a large number of visitors.

VISUAL

To determine visual resource values, public lands are evaluated and placed into visual resource management (VRM) classes during the Resource Management Planning (or plan amendment) process. Each VRM management class is then managed for the following objectives:

Class I--Preserve the existing character of the landscape. The level of change should be very low and must not attract attention.

Class II--Retain the existing character of the landscape. The level of change should be low and management activities may be seen but should not attract attention.

Class III--Partially retain the existing character of the landscape. The level of change should be moderate and management activities may attract attention but should not dominate.

Class IV--Provide for activities which require major modification of the landscape. The level of change can be high.

Glenwood Springs Resource Area

The most unique scenic and sensitive areas of public land are identified for VRM Class I objectives to preserve the existing character of the landscape. In the GSRA, these include the Deep Creek, Bull Gulch and Thompson Creek areas, which are designated Areas of Critical Environmental Concern (ACEC) to protect scenic values. In addition, there are other areas, particularly along the I-70 corridor, that are managed for VRM Class II objectives to retain the existing landscape character (see Map K-11, Appendix K). Within these areas, management activities, including oil and gas development, may be seen but should not attract the attention of the casual observer.

Kremmling Resource Area

In the KRA the majority of public lands provide the foreground and middle ground landscapes to scenic mountain vistas when viewed from major travel routes such as US Highway 40. Public lands along these travel routes and along the Colorado River are managed for VRM Class II objectives. The remainder of the public lands within the Resource Area is managed for VRM Class III and Class IV objectives.

Little Snake Resource Area

The outstanding scenic areas in LSRA, which are highly visible in the foreground along travel routes, populated areas, and in extensive recreation areas, were designated for VRM Class II objectives to retain the natural landscape character. These areas include slopes facing U.S. Highway 40, the Yampa River, along several state highways, and county and BLM roads.

Northeast Planning Area

Because of the amount of private land involved in the NPA, a visual resource inventory has not been done, and VRM classifications are made when activities are proposed. In general, the public lands in the eastern plains (where oil and gas development potential is considered medium and high) are managed for VRM Class III and Class IV objectives. Some public lands along travel routes such as the I-70 corridor and adjacent to state, county, or local parklands are managed for VRM Class II objectives. These lands generally are considered to have little oil and gas development potential.

San Juan/San Miguel Planning Area

Within the SJ/SMPA, approximately 96,000 acres of public land are important landscape areas. The Dolores River Canyon WSA is managed consistent with VRM Class I objectives. Areas managed for VRM Class II objectives include: the Dolores River Canyon from Bradfield Bridge to Disappointment Creek; Weber and Menefee Mountains; public lands along the boundary of Mesa Verde National Park; public lands along the San Miguel River; key travel routes in the Silverton area; and Cross, Cahone, Squaw/Papoose, and Tabeguache Creek Canyons (see Map M-6, Appendix M).

CULTURAL RESOURCES

In Colorado there are two types of cultural resources found on public lands: prehistoric and historic.

Prehistoric cultural resources, both known and unknown, can include, but are not limited to, the following list: lithic scatters, hunting sites, kill/butchering sites, hunting racks, quarry sites, temporary camps, pueblos, agricultural terraces, towers and rockshelters, extended camps, pit houses, wickiups, granaries, cists, process areas, burial sites, petroglyph-pictograph panels, trails, race tracks, vapor caves, villages, manufacturing sites, vision quest sites, and isolated artifacts. These resources were used during the past 10,000 to 15,000 years by peoples of the Paleo-Indian, Archaic,

Anasazi, Fremont, and proto-historic native peoples.

Historic sites, both known and unknown, can contain a prehistoric element. Historic sites can include: trails, forts, toll and wagon roads, resorts, bridges, homesteads, ranches, railroads, towns, mines, mills, and schools. These sites are associated with farming, ranching, mining, commerce, and exploration activities that occurred during the late 18th, 19th, and 20th centuries.

Of particular concern are Native American sacred/religious places. A Native American sacred/religious place is a location that has traditionally been considered important to an Indian Tribe or member thereof, because of a religious event which happened there. The sacred/religious place may have played a part in life-cycle rituals of individuals, may contain specific natural products which are of cultural or religious importance, may figure in or is mentioned in myths and sacred songs, may be considered the dwelling place or embodiment of spiritual beings, may be conducive to communication with spiritual beings, or may have other specific and continuing significance in Indian religion or culture. Such places may be considered important to entire Indian tribes or groups of tribes, or may be considered important to smaller segments of Indian populations, such as chapters, clans, families, or individuals. (Sacred places may be protected under the provisions of 36 CFR 60.4 and the American Indian Religious Freedom Act (AIRFA)). No such sites have been identified within the Study Area, but such sites are likely to exist especially within the SJ/SMPA.

Based on present data, the following sites or areas are either listed or considered to be of National Register of Historic Places quality, and represent significant values that warrant protection from potentially destructive disturbance. There is significant potential that new cultural resource inventories conducted in advance of surface-disturbing activities will identify more cultural resources that will qualify for National Register listing. In addition, many known sites have not been evaluated.

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Glenwood Springs Resource Area

- Blue Hill Archaeological District (4,178 acres)

Kremmling Resource Area

- Windy Gap Cultural Resource Management Area (398 acres)

Little Snake Resource Area

- Irish Canyon Petroglyphs (80 acres)

Northeast Planning Area

- Georgetown - Silver Plume National Historic District
- Central City National Historic District
- Switzerland Trail (Railroad) Historic District

San Juan/San Miguel Planning Area

(see Map M-7, Appendix M)

- Lowry Ruin National Historic Landmark and Associations (880 acres, 280 acres split estate)
- Sand and East Rock Canyons (5,880 acres)
- Cannonball Ruin (80 acres)
- Dominguez-Escalante Ruins and Anasazi Heritage Center (55 acres)
- Tabeguache Cave II and Tabeguache Canyon (3,200 acres)
- Dolores Cave (60 acres)
- Tabeguache Pueblo (200 acres)
- McLean Basin Towers and Associations (200 acres)
- Squaw/Papoose, Cross/Ruin, and Cahone Canyons and Cow Mesa (28,464 acres)
- Painted Hand Petroglyphs and Associations (240 acres)
- Painted Hand Ruin (160 acres, 40 acres split estate)
- Indian Henry's Cabin and Associations (280 acres)
- Lightning Tree Tower Group (200 acres)
- Hamilton Mesa (5,018 acres)
- Battle Rock (40 acres)
- Easter Ruin (160 acres, 80 acres split estate)
- Seven Towers Ruin Group (120 acres)
- Bull Canyon Rockshelter (5 acres)
- Hanging Flume (7 acres)
- Mockingbird Mesa 1/ (6,603 acres)
- Hovenweep Canyon 1/ (3,400 acres, 980 acres split estate)
- East Cortez (6,420 acres, 480 acres split estate)
- Goodman Canyon and Goodman Point Buffer Zone 1/ (1,560 acres, 295 acres split estate)

- Cuthroat Castle Ruin Group Buffer Zone (320 acres)
- Bass Ruin Complex 1/ (500 acres)
- Sandstone Canyon 1/ (2,840 acres,
- Brewer Well Complex 1/ (590 acres,
- Yellowjacket Canyon 1/ (5,120 acres, 1,640 acres split estate)
- Basin Wickiup Village (400 acres, 160 acres split estate)
- Woods Canyon 1/ (980 acres)
- Bridge Canyon 1/ (1,120 acres, 155 acres split estate)
- Albert Porter Ruin 1/ (120 acres, 80 acres split estate)
- Upper Ruin Canyon 1/ (640 acres, 60 acres split estate)
- Bowdish Canyon (1,000 acres)
- Silverton Historic District (34,000 acres)
- Dolores River Canyon (50,900 acres)

1/ All or parts of these designated areas are within the McElmo Dome Unitized area for carbon dioxide (CO₂). All leases within the unitized area are currently held by production and will not expire until approximately two years after the termination of the unit. If additional production is established during the two year period, those individual leases will continue to be held by production. Therefore, no new leasing will take place within this area until after the unit has terminated.

PALEONTOLOGY

Fossils occur in many geological formations throughout Colorado. These formations are classified into categories that indicate the likelihood of significant fossil occurrence. Those geological formations which are known to contain significant vertebrate, invertebrate, and plant fossils include, but are not limited to, the following.

Glenwood Springs Resource Area

- Wasatch - early horses, rhinoceroses, birds, rare primates, and crocodiles (see Map K-12, Appendix K)

AFFECTED ENVIRONMENT

Kremmling Resource Area

- North Park - mammals
- Troublesome - mammals
- Morrison - dinosaurs
- Sandstone Members of the Pierre Shale
-- ammonites

Little Snake Resource Area

- Morrison - dinosaurs
- Mesaverde
- Green River
- Wasatch
- Browns Park

Northeast Planning Area

- Tertiary Sediments
- Morrison - dinosaurs
- Dakota - vertebrate tracks

San Juan/San Miguel Planning Area

- San Jose - vertebrate (mammals)
- Mancos Shale - invertebrates
- Dolores - flowering plants
- Morrison - vertebrates, dinosaurs, and invertebrates
- Chinle - vertebrate (fish) and plants
- Mesaverde - invertebrates
- Burro Canyon and Dakota Sandstone-- plant and invertebrate
- Animas - plant
- Cutler - vertebrate

WILDERNESS

Wilderness resources on BLM-administered public lands were identified through inventories completed in 1980. Areas found to possess wilderness characteristics were identified as wilderness study areas (WSAs). These areas are managed under interim management guidelines that prohibit activities which might impair wilderness values pending a decision on wilderness designation by Congress. The Federal Land Policy and Management Act (FLPMA) provides that by 1991 the Secretary of the Interior will recommend to the President and Congress those areas that should be designated.

Interim management of WSAs is further constrained by provision of the Federal Onshore Oil and Gas Leasing Reform Act of 1987 which prohibits leasing WSAs. Exceptions to this prohibition may only be

made to prevent drainage of the federal oil and gas resource and then only with a No Surface Occupancy stipulation to prevent impairment of wilderness values.

Table 3-7 displays by Resource/Planning Area, each WSA, its size, and wilderness suitability recommendation. For example, the GSRA contains four WSAs, totalling 27,280 acres. Three of these WSAs, totalling 10,754 acres, are recommended for Congressional wilderness designation. The Castle Peak WSA, and part of the Bull Gulch WSA are not recommended for wilderness because of conflict with other resource management actions. Whether recommended suitable or not, all WSAs are under interim wilderness management to protect their wilderness qualities (see Maps K-13, N-1, L-2, M-8).

Cross Mountain (located in LSRA), while closed to leasing under BLM's interim management policy, is recommended to be opened to leasing with No Surface Occupancy allowed. This is because of the unique topography which is possibly conducive to directional drilling.

There are no designated wilderness areas or wilderness study areas managed by BLM in the NPA. However, there are split estate lands containing federal minerals managed by BLM adjacent to the Indian Peaks Wilderness Area which is managed by the Arapaho-Roosevelt National Forest. The potential of development (POD) for oil and gas near Indian Peaks is considered to be low.

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TABLE 3-7. WILDERNESS STUDY AREAS

Location	WSA Name	Size (acres)	Recommendation
Glenwood Springs Resource Area	Eagle Mountain	330	Suitable
	Hack Lake	10	Suitable
	Bull Gulch	10,414	Suitable
		4,586	Non-Suitable
	Castle Peak	11,940	Non-Suitable
	Totals	10,754	Suitable
		16,526	Non-Suitable
Kremmling Resource Area		27,280	
	Troublesome	8,250	Non-Suitable
	Platte River Contiguous	30	Suitable
	Totals	30	Suitable
		8,250	Non-Suitable
Little Snake Resource Area		8,280	
	Cross Mountain	14,081	Suitable
	Diamond Breaks	31,480	Suitable
	West Cold Spring	17,682	Non-Suitable
	Ant Hills	4,354	Non-Suitable
	Chew Winter Camp	1,320	Non-Suitable
	Peterson Draw	5,160	Non-Suitable
	Vale of Tears	7,420	Non-Suitable
	Totals	45,561	Suitable
		35,936	Non-Suitable
		81,497	
Northeast Planning Area	None		
San Juan/San Miguel Planning Area	Cahone Canyon	8,960	Non-Suitable
	Cross Canyon	12,588	Non-Suitable
	Dolores River Canyon	29,415	Suitable
	McKenna Peak	19,562	Non-Suitable
	Menefee Mountain	7,129	Non-Suitable
	Squaw/Papoose Canyon	11,287	Non-Suitable
	Tabeguache Creek	7,908	Suitable
	Weber Mountain	6,303	Non-Suitable
	Totals	37,323	Suitable
		65,829	Non-Suitable
		103,152	
Study Area Totals	93,032	Suitable	
	126,541	Non-Suitable	
	219,573		

LANDS AND REALTY ACTIONS

The land ownership pattern varies from large blocks of public lands, to areas where federal ownership is limited to small (less than 40 acres) scattered parcels of land. Public lands and federal mineral estate comprise about

one-third to one-half of the land area within each Resource/Planning Area, except in the

NPA where it comprises less than three percent. The proportion of land potentially available for federal leasing is therefore locally significant in all but the NPA. However, even in the NPA, there are large blocks of split estate where the federal

government owns the oil and gas resource underlying private or state-owned lands.

Various types of land-use authorizations are scattered throughout the public lands. These include linear rights-of-way, such as pipelines, power and telephone lines and roads; site-type rights-of-way, such as communication sites; leases under the Recreation and Public Purposes Act (R&PP); and leases/permits under Section 302 FLPMA. BLM's existing land use plans either identify corridors suitable for linear rights-of-way, or they use a "zoning" approach to identify area suitable or unsuitable for rights-of-way placement. Certain lands within the NPA are rights-of-way which were granted for railroads and reservoir purposes. The BLM retains or has acquired the mineral rights under some of these lands, and is empowered to lease such mineral rights under the Act of May 21, 1930. Most of the railroad rights-of-way are generally 200 feet wide with railroad tracks in the center. Irrigation rights-of-way can vary in size, but are ordinarily for the purposes of constructed reservoirs. Some have additional values of recreation use and wildlife use, as well as the storage of irrigation water.

The greatest number of existing authorizations are related to linear rights-of-way, including some for major facilities such as power transmission lines, oil and gas transportation pipelines, and state or federal highways. Gathering system pipeline rights-of-way are generally concentrated in specific areas associated with energy development.

In some areas, the BLM has mineral rights under private surface property for which the Department of Defense (DOD) has obtained a right-of-way from the private surface owner for "Missile Cable" installation. The BLM has no direct authority over such rights-of-way and the leasing rights of the BLM are not legally bound by these subsequent rights-of-way, however the BLM policy is to try to protect the DOD interest to the extent possible by warning oil and gas lessees of their existence and recommending they contact the DOD. This can only be done to the extent that DOD furnishes the missile cable locations.

TRANSPORTATION

Primary access within the Study Area is furnished by interstate highways, state highways, county roads, and public access roads. The majority of public lands are accessible to the general public via one of the above mentioned roads. Some areas do have significant amounts of BLM lands that are not accessible due to steep terrain, lack of maintained roads, or lack of legal access across private lands. Approximately 90 percent of the BLM roads in the areas are not maintained on a regular basis.

SOCIAL AND ECONOMIC

Glenwood Springs Resource Area

The area most likely to incur socioeconomic impacts from oil and gas development in the GSRA includes Mesa and Garfield Counties. While virtually all of the drilling and production would occur in central Garfield County, most of the locally supplied labor, equipment, and materials would come from Mesa County. The Grand Junction area has historically been a center for the oil and gas industry in western Colorado. Despite the turndown in activity in recent years, a number of oil and gas service and supply companies continue to work out of Grand Junction and the area can be expected to remain an industry hub through most foreseeable levels of development. However, unless levels of development in the next 20 years approach that of the early 1980s, the better part of the labor and equipment required will come from dispersed locations outside the area of impact, e.g., Casper, Farmington, Denver. This will considerably lessen the local socioeconomic impact of field development. The eastern and southern portions of the GSRA, Eagle and Pitkin Counties, can be expected to receive little or no impact and have been excluded from this analysis.

Table O-1 in Appendix O shows recent trends in population, employment, and income in Mesa and Garfield Counties. The changes that the GSRA incurred between 1977 and 1982 are a result of the boom brought on by the development of energy fuels, including oil and gas, in the area. The changes since then are the product of the downturn in prices

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of energy fuels. While employment and income related to the oil and gas industry cannot be calculated with any exactness at the county level, it is possible to estimate those figures. A 1980 survey (McKean, Weber, and Ericson 1981) indicated that about 5.5 percent of Mesa County's employment was directly or indirectly tied to the oil and gas industry. Assuming that ratio is still good, approximately 2,400 Mesa County jobs are today tied to the industry. Both the percentage and the total for Garfield County are much lower.

Production in the two-county area averaged just under 11 million mcf during 1980 to 1988 from an average of 310 producing wells. The low point was 1987's 6.6 million mcf, which was 41 percent less than the high of 1982, 15.4 million mcf.

Kremmling Resource Area

The KRA, for social and economic analysis, consists of Grand and Jackson Counties. Where BLM-controlled resources are located outside of those two counties--in adjacent portions of Eagle, Larimer, and Summit Counties--the resources are included in the analysis, but their use is treated as affecting only the two-county area.

Population

The Resource Area has experienced a rapid rate of population growth since 1970, in contrast to a relatively slow increase during the previous decade (Table O-2, Appendix O). The rate at which people have moved in to the Resource Area from 1970 to 1980 has been almost double that at which they have moved into the state. However, as might be expected, most of the growth has occurred in Grand County.

Economic developments readily explain the way population is distributed. Almost 90 percent of the growth since 1970 has occurred in two areas--the strip from Winter Park to Granby and western Grand County. In the latter case, the bulk of the growth has concentrated in or adjacent to the town of Kremmling. Northern and south-central Grand County have gained relatively few people. The period of 1980-87 reflects a slower rate of population growth for the Resource Area. In fact, Jackson County has

experienced an 11 percent decrease in population for this period.

Recreation, including recreation homes, accounts for the largest part of the increase, which is in the eastern Grand County strip. The traditional elements of the economy--ranching and the timber industry--have had little effect, or a negative one, on population levels and distribution.

Employment and Income

In the last few years, a small amount of growth has occurred in the total labor force and in employment in the Resource Area (Table O-3, Appendix O). However, most of the growth has taken place in Grand County. From 1975 to 1987, the Resource Area's rate of increase has trailed that of the state as a whole. The unemployment rate remains below that of the state. Employment figures for the individual industry groups illustrate recent trends in the area's economy (Tables O-4 thru O-7, Appendix O). Personal income figures have shown nearly the same trends as employment (Tables O-8 thru O-11, Appendix O).

Local Government Finance

Rough measures of the adequacy of local funding sources are provided by assessed valuation per capita and retail sales per capita figures (see Table O-12, Appendix O). The figures show that both counties and the towns of Fraser/Winter Park and Grand Lake should have sufficient tax bases for their needs. Fraser, Winter Park, Granby, and Grand Lake also have large volumes of retail sales because of their role as resort centers. The other communities lack these advantages and must operate from more limited local resources.

Probably the most significant impact on local government finances from BLM actions would come from increased capital improvement needs caused by population growth. Conversely, reduced population would increase the burden of any existing debt on remaining residents. It should be noted that rapid population growth can quickly require capital spending in excess of the resources of most local governments. In which case, their only recourse is to seek financial assistance from state and federal programs.

Social Analysis

For social analysis, the KRA will consider Jackson and Grand Counties, omitting small portions of Larimer, Eagle, and Summit Counties.

The present social environments of the region cannot be understood without consideration of its history, geography, topography, climate, and location relative to the eastern slope population centers. There are three separate areas described below.

Jackson County, with the single incorporated town of Walden, is set in North Park, a high cold valley separated from the rest of Colorado by high mountain passes and opening to Wyoming on the north. Ranching, lumbering, and mining are its main economic bases. A mountainous section of Larimer County lying across the Medicine Bow Range in this region orients to Wyoming and is virtually unpopulated.

Grand County consists of an east-west natural division of Middle Park, separated by Byers Canyon. Kremmling is the only population centering the western portion, a rugged ranching valley somewhat lower than North Park in elevation. It is separated from northwest Colorado by high passes, but open southward through Blue River Valley. Portions of Eagle and Summit Counties are found in this section.

Eastern Grand County has a T-formation of small towns: Hot Sulphur Springs on the west; Grand Lake on the north; and Tabernash, Fraser and Winter Park on the south, with Granby as the central hub. Eastern Grand County accesses eastern, southern, and northern Colorado only by high passes. Trail Ridge Road from Grand Lake is closed except for a few months in summer. (The two natural divisions of Middle Park correspond also to the Census Bureau Kremmling and Granby divisions.)

Little Snake Resource Area

Economics

The affected area of the economic analysis for LSRA is limited to Moffat and Routt Counties in Colorado. Since economic data is available only in county units, the economic analysis is defined in terms of these

units. In each category, data is the most current available from the source listed.

Employment and Income

Figures for comparison of employment are shown in Tables O-13 and O-14 (Appendix O). The figures are by place of residence and do not factor commuting. For this reason, they will differ from most other employment and income figures.

The economies of the two affected counties of the area are based on mining, agriculture, and trade. However, Routt County has skiing and related seasonal resort activities as its principal economic activity. Coal is the leading economic mineral in both Moffat and Routt Counties, and there are coal-fired electric power plants in both Moffat and Routt Counties.

Agriculture, primarily livestock production, remains an important industry in both counties. However, it has become small numerically compared to the other major sectors.

The principal center of tourism is Steamboat Springs, which is a year-round resort. Hunting remains a viable seasonal industry in the area.

Minerals

Coal and coal-driven power production accounts for significant employment as well as contributing to greater personal income for the Resource Area. As Table O-15 (Appendix O) indicates, 15.3 percent of all employment and 20.2 percent of all personal income were derived from coal and other mineral production in 1985.

Agriculture

Livestock production is the principal agricultural commodity. Crop production is dominated by hay for livestock feed. Individual proprietor's average 1982 and 1984 livestock and crop earnings are shown in Table O-16 (Appendix O).

Recreation

Hunting, camping, fishing, and sightseeing continue to grow in terms of revenue generated. In 1980, these four categories

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accounted for \$41.4 million; by 1985, revenue was \$48.4 million. These four sectors accounted for 30 percent of all recreation revenue in 1980 and 26 percent in 1982. The percentage decline occurred because of marked growth in the ski sector from 1980 to 1987. Although the ski industry does not directly affect BLM lands, its income generation is so large that it must be mentioned. In 1982, skiing activities accounted for \$73.8 million; by 1986, revenue was \$111.9 million.

Population

Figures for 1986 reveal a concentration of population in two cities, Craig and Steamboat Springs, with growth occurring between the two cities and in the satellite towns of Oak Creek and Hayden. Both Craig and Steamboat Springs serve as local trade and business centers. Regional trade, business, manufacturing, communication, and service centers are located in Grand Junction and Denver. See Table O-17 (Appendix O) for population figures.

Housing

Vacancy rates were approximately 23 percent in Moffat County and 14 percent in Routt County in 1986. Demand for new and existing homes in Moffat County, particularly Craig, has fallen considerably since 1980. Accordingly, prices for homes are starting to decline. Demand for new and existing homes in Routt County, especially Steamboat Springs, is moderate because the town is a growing ski resort. Vacancy levels listed in Table O-18 (Appendix O) should be read with caution, particularly data for Steamboat Springs, because vacancy levels do not indicate whether housing units are occupied year-round or are seasonal. Also, the rates for Moffat County do not indicate physical condition of the properties.

Local Government Finances

In Colorado, communities generally obtain most of their revenues locally. Previous studies in this area have shown that local sources account for 65 to 95 percent of total community revenues. This large dependence on local revenue sources means that the communities can be highly impacted by developments that affect their tax base. Local school districts, however, are becoming less

dependent on locally generated revenues because of state equalization formulas.

Rough measures of local funding sources are provided by the per capita figures on assessed valuation and sales taxes in Tables O-19, O-20, O-21 (Appendix O). They indicate that, in general, the larger municipalities have more substantial property and sales tax bases, but that these and school districts' tax bases vary considerably. Those municipalities and school districts that have strong tax bases--generally because they are either business, mining, or tourist centers--are in a better position to handle additional financial impacts.

Presently, municipalities and special districts are restricted by state law in increasing revenue to fund programs. For example, statutes impose a seven percent limit on annual increases in property tax revenues and a four percent limit on combined municipal and county sales tax rates. However, Moffat County has only a two percent sales tax rate, and Routt County has no sales tax at all. Therefore, municipalities in these two counties have some leeway to increase revenues.

Table O-22 (Appendix O) presents 1985 monies generated in the two counties as a result of federal leasing of minerals, and the amount returned to state and local governments. The two counties generated just under 20 million dollars in 1985 from rentals and royalties of public lands. The counties' share of generated royalties and rentals is subject to 34-63 Colorado Revised Statute, which subjects the 50 percent federal return to distribution approval of the state legislature.

BLM also generates revenue from the Taylor Grazing Act, which produced a gross revenue of \$150,140 in 1985 in Moffat County and \$58,907 in Routt County. Under Section 10 of the Act, \$22,521 was returned to Moffat County and \$8,836 to Routt County.

Perceptions and Attitudes

Craig District BLM constantly acts in a highly politically-charged social environment because of the history of the region, the variety of resources and land management options, and the large proportion of

AFFECTED ENVIRONMENT

subsurface and surface land under federal control in the district.

When the BLM was formed, absorbing the Grazing Service, new responsibilities for land management were added beyond the monitoring of grazing use. The new management responsibilities included both renewable resources (range, forests, wildlife, air, and water) and nonrenewable resources (soils, minerals). The BLM became concerned with managing the land for recreation, minerals extraction, forestry, wildlife habitat, agriculture, and a variety of other uses in addition to grazing. Perceptions of excessive governmental control became common among ranchers.

This expanded diversity of roles of BLM in land-use planning is of particular significance at the national level because of the environment-versus-development controversy that exploded in the late 1960s and has continued ever since, becoming one of the primary present national political and social issues. The LSRA occupies a significant position in this controversy.

Community Settings and Conditions

Craig and Maybell in Moffat County, and Hayden, Milner, Steamboat Springs, Oak Creek, Phippsburg, and Yampa in Routt County, lie within the LSRA. Maybell, Milner, and Phippsburg are unincorporated but socially close-knit communities in which virtually all interaction, including the making of "official" community decisions, is informal.

Northeast Planning Area

Except for several small communities on the Front Range, BLM management does not significantly influence local revenue and infrastructure in the NPA. The most important aspect is the distribution of oil and gas royalties, and payment-in-lieu-of-tax payments. However, local and district revenues are obtained primarily from local sources (e.g., property tax). Other resource contributions include grazing leases, dispersed recreation, fuel wood, and consumptive and nonconsumptive uses of wildlife.

A majority of Colorado's population is in the northeast part of the state, 72 percent of the state's population lives along the Front Range

from El Paso to Larimer County. In contrast, the eastern plains in the Planning Area constitute seven percent of the total population.

The counties east of the Front Range are primarily farming and ranching, and many communities serve as stops along major highways. Activities associated with oil and gas exploration and development such as construction and supplying laborers, are important to many of the small towns near the oil and gas fields. These small towns include New Raymen, Fort Morgan, and Wray. Much of the economies in the counties west of Denver are tourist based. The military and state colleges are important contributors to the economies of the Front Range and Weld County. The Denver area is the regional headquarters of many large business, as well as a large retail base. It also attracts a large number of tourists.

San Juan/San Miguel Planning Area

The affected area of the economic analysis is limited to seven counties in Colorado. The total 1986 population of these counties was approximately 84,325. Table O-23 (Appendix O) shows the 1980 and 1986 population, per capita income and number of persons employed by county and state. Population growth may be seen in all counties except Dolores and San Juan. All of the counties in the Planning Area have a notably lower per capita income than the Colorado average. Table O-24 (Appendix O) shows county employment by economic sector. The service sector, retail trade, government, and agriculture are the larger sources of employment in the area.

Recreation

The Planning Area derives significant economic benefit from expenditures made for recreation activities, many of which are not currently quantifiable--hiking, camping, and backpacking. However, numerical data do exist for fishing, hunting, whitewater boating, archaeological viewing and interpretation, and generalized tourist travel in the area.

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Tourist Expenditures in General

Tourist travel is an important contributor to the Planning Area economy. Tourist expenditures in 1987 totaled \$208 million creating employment for 5,634 people. Table O-25 (Appendix O) shows the 1987 impact of tourist expenditures to the counties in the Planning Area.

White Water Boating

The Dolores River is extensively used for whitewater boating. A 1987 estimate of 10,000 recreation visitor days was made for the Dolores. Expenditures for whitewater boating are estimated at \$1.2 million annually within the Planning Area.

Fishing and Hunting

Fishing and hunting activity in the area contribute considerable primary and secondary expenditures to the economy of the region. Table O-26 (Appendix O) shows county primary expenditure data by category.

Many residents value the rural character of the area as an important part of their lifestyles. An appreciation for the wide-open spaces, natural values, solitude, and personal freedom is generally found. Outside control of land or any kind of outside interference is generally resented.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Some areas of BLM-administered lands are managed to protect or enhance particular, special, or unique values. The areas are formally designated as Areas of Critical Environmental Concern (ACEC). More specific information concerning each ACEC is available in the respective Resource Area Office (see Maps K-14, N-2, L-3, M-9).

MINERAL RESOURCES

Mining has been an integral part of Colorado since Man arrived in the region. Native Americans utilized clays for paint and pottery. They used flint and chert to make projectile points, and semi-precious stones and native metals for ornaments. With the arrival of Europeans, mining activity increased markedly. Presently, there is active or proposed extraction of a wide variety of minerals in the Study Area. Table 3-9 shows the mineral resources currently known to be in minable concentration in each of the five Resource/Planning Areas.

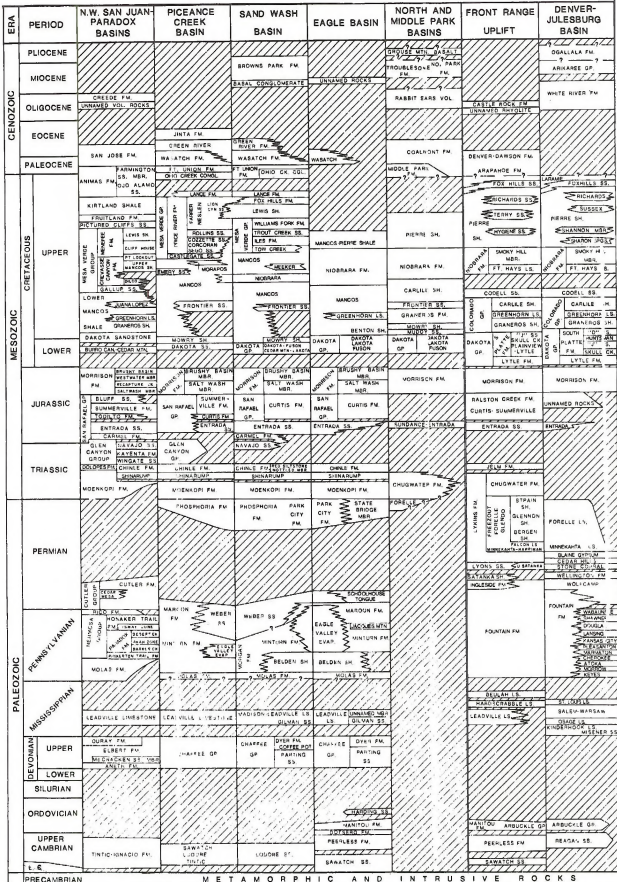
Geologic Setting

Rocks ranging throughout the geologic time sequence from Precambrian to Recent are represented in the Study Area (see Generalized Geologic Stratigraphic Charts, Figure 3-1). The complex tectonic and depositional activity responsible for the

TABLE 3-8. SPECIAL MANAGEMENT AREAS

RA/PA	ACEC Name	Critical Resource	Acres
GSRA	Thompson Creek	Recreation/Visual	4,286
GSRA	Bull Gulch	Recreation/Visual	10,214
GSRA	Deep Creek	Recreation/Visual	2,470
GSRA	Blue Hill	Cultural	4,178
GSRA	Debris Hazard	Hazard Area	7,126
GSRA	Lower Colorado River	Riparian	9,000
KRA	Ammonite Site	Paleontology	197
KRA	Phacelia Site	T&E Plants	310
LSRA	Irish Canyon	Scenic/Plants/Cultural	11,680
LSRA	Lookout Mountain	T&E Plants	6,500
LSRA	Cross Mountain	Scenic/T&E Plants	3,000
LSRA	Limestone Ridge	Scenic/T&E Plants	1,350
SJ/SMPA	Anasazi Culture	Cultural	156,000
SJ/SMPA	McElmo	Rare Flora & Fauna	443
SJ/SMPA	Tabeguache Creek	Scenic	440

Fig. 3-1 COLORADO STRATIGRAPHIC NOMENCLATURE CHART



COMPILED BY R H PEARL

SOURCE OF DATA: CROSS SECTIONS, ATLAS OF THE ROCKY MOUNTAIN REGION

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spectacular mountain ranges, valleys, basins, and the high plains of Colorado are the same processes that have left some of the richest mineral deposits in the world. The principle structural features in Colorado are shown on Map 3-3.

Oil and Gas

The first oil well was drilled in Colorado in 1862 near Florence in Fremont County. Oil and gas development spread rapidly across the state. First to the northeast, Denver-Julesburg Basin (NPA), then to the west slope. Many fields developed prior to 1920 are on lands patented under the General Mining Law of 1872. With the passage of the 1920 Mineral Leasing Act, fields have been developed on public lands with leases issued by the Department of the Interior.

Drilling and production in the Study Area are characterized as moderate compared with the western United States. New and refined exploration concepts and technology have resulted in geological interpretations that indicate a potential for the existence of new fields and the expansion of some existing ones. A detailed description of the oil and gas resources and the potential for development for the entire Study Area is found in Appendix B.

Coal

Federal coal leasing has slowed to a level necessary for maintenance of existing mines. This down-turn in coal mining is due to several factors, chief among which has been the dramatic drop in coal prices since 1982.

Federal coal is leased under provisions of the 1920 Mineral Leasing Act, as amended. An environmental impact statement, in compliance with the National Environmental Policy Act of 1969, is prepared for each lease tract as applications are submitted. Coal resources within the five Resource/Planning Areas are described in the respective RMP/EIS.

Uranium and Vanadium

Uranium resources are found in abundance in all five Resource/Planning Areas. Uranium has been mined in quantity from the Browns Park Formation in LSRA, between Maybell and Lay. It has also been mined from the

principal uranium and vanadium producing region in the state, the "Uravan Mineral Belt." The Belt extends from Gateway through Uravan to Slick Rock in the SJ/SMPA. Presently, SJ/SMPA is the only area with active uranium and vanadium mining. Renewed interest in vanadium seems to be the main reason.

Precious Metals

Historically, gold and silver have been mined in all five Planning/Resource Areas. Presently, gold is mined in the SJ/SMPA and NPA. Numerous claims are located in all five Planning/Resource Areas and interest has been expressed in reopening or beginning new operations in some of the areas.

Base Metals

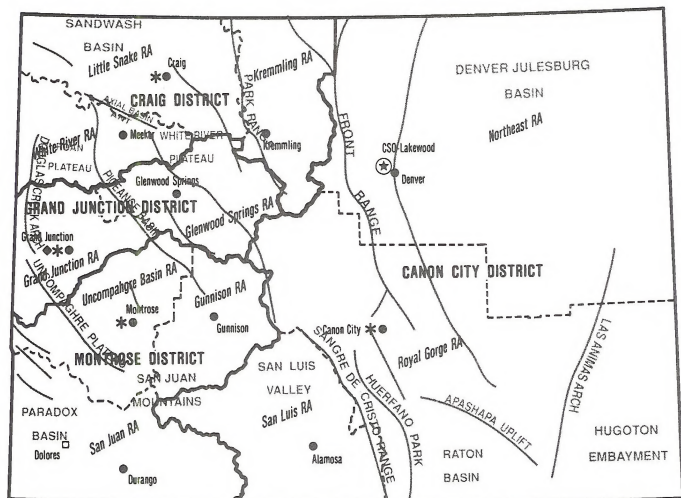
Small, scattered deposits of base metals, including copper, lead, zinc, tungsten, molybdenum, iron, and manganese are found in all five Planning/Resource Areas. These deposits are found in igneous and Paleozoic age sedimentary rocks. Presently, there are no mining operations proposed for any of these deposits on BLM lands.

Limestone

Chemical grade limestone is found in GSRA and LSRA. High calcium limestone of this type is in demand for use in cleaning power plant flues and control of rock dust in coal mines. Mining of this resource is presently taking place on BLM-administered lands in the GSRA. Some marble deposits are known in GSRA; however, no mining operations are proposed.

Stone, Sand, and Clay

Sand, gravel, decorative stone, scoria, and clay occur throughout the Study Area. Sand, gravel, and scoria are primarily used in road construction, while decorative stone is used mainly for construction. Clay deposits within the Planning/Resource Areas have been used in the past as a source of commercial bentonite or for manufacture of brick and tile. Quarrying operations for these materials exists in all areas.



Map 3-3 Principal structural and tectonic features of Colorado

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TABLE 3-9. MINERALS PRESENT IN POTENTIALLY MINABLE CONCENTRATIONS

Mineral	Glenwood Springs	Kremmling	Little Snake	Northeast	San Juan/San Miguel
Carbon Dioxide		X			X
Coal	X	X	X	X	X
Natural Gas	X	X	X	X	X
Geothermal	X	X	X		X
Oil	X	X	X	X	X
Oil Shale	X				
Gold	X	X	X	X	X
Silver		X	X	X	X
Lead			X	X	X
Copper	X	X	X	X	X
Iron			X		
Zinc			X	X	X
Tungsten				X	X
Molybdenum				X	
Uranium	X	X	X	X	X
Vanadium	X	X	X	X	X
Manganese	X				
Gypsum	X			X	X
Potassium	X				
Sodium	X				X
Limestone	X		X		
Marble	X				
Fluorite		X			
Sand (Construction)	X	X	X	X	X
Sand (Refractory)			X		
Clay (Bentonite)				X	
Clay (Common)			X	X	X
Clay (Shale)				X	
Clay (Refractory)				X	
Clay (Pottery)				X	
Scoria	X		X		
Decorative Stone	X		X	X	X
Gravel	X	X	X	X	X
Top Soil	X				
Fill Dirt	X				X

Geothermal

Geothermal resources occur in GSRA, KRA, LSRA, and SJ/SMPA. Presently there is one geothermal lease on BLM-administered lands in the GSRA.

no current operations proposed, and none are anticipated during the life of this plan.

Gypsum

Approximately 500,000 tons of gypsum are mined annually in GSRA. Minable concentrations of gypsum are available in all of the areas except LSRA and KRA.

Oil Shale

Oil shale deposits occur in western GSRA. While proposals have been made to produce oil from these deposits in the past, there are

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INTRODUCTION

This chapter describes the impacts of the various alternatives on specific environmental components. The only environmental components described are those that may be affected by one or more of the alternatives.

The analysis was completed using the following assumptions:

- The oil and gas activity would occur as described in Chapter 2--Proposed Action Alternative and Appendices A and B.
- The laws and regulations will not change substantially over the next 20 years.
- All lease terms and conditions will be adhered to and that they are effective in mitigating impacts.
- Reclamation procedures will be completed and will be successful.
- There will not be any major shifts in the BLM's land management plans, policies, or emphasis.
- Development of coal-bed methane was considered in the production of the Potential of Development (PODs) for the GSRA, LSRA, and SJ/SMPA.

CLIMATE AND AIR QUALITY

Climate will not be impacted. Impacts to air quality will be very minor, short-term, and very localized.

San Juan/San Miguel Planning Area

Coal-bed methane development in the Fruitland Formation of the San Juan Resource Area concerns many local individuals and groups. One concern expressed involves potential problems arising from methane liberated to the atmosphere from the coal beds as a result of

development. If significant methane is liberated from the outcrop to the atmosphere, there is the potential for adverse impacts. Impacts might include pollution of shallow groundwater aquifers and streams. At present, there is no data to support a conclusion that coal gas development has or will increase gas liberation at the outcrop. However, in order to build a data base, the San Juan Resource Area Office will require operators of federal wells in proximity to the outcrop area to monitor (and report to the BLM the results) changes in soil gas content (see COA, Appendix F).

VEGETATION

All Alternatives

Conducting preliminary exploration (seismic operations) would cause the loss of some vegetation. Vegetation would be crushed by vehicles on the line, and therefore, the loss would be minimal and short-term in nature. Overland travel off existing roads for seismic exploration during wet soil conditions would increase the degree of vegetation destruction.

Construction of access roads and drill pads for drilling wildcat wells would result in the loss of approximately ten acres of vegetation per well site. With proper reclamation following completion of drilling activities, this loss of vegetation would be short-term, assuming that reclamation success would take approximately three to five years. There is a likelihood that undesirable weeds would invade the disturbed ground at some point before reclamation is complete.

On the sites where wildcat wells become discovery wells, the loss of vegetation due to access roads and drill pads would become more long-term due to the relative permanence (in excess of 15 years) of these installations. Although as much as 1/2 of the two-acre drill pad may be reclaimed at the

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time of developing a permanent well site, additional road, pipeline, and other facility development would increase the actual loss of vegetation associated with each well. The maximum amount of vegetation that could be lost over the 20-year period amounts to approximately 17,900 acres. This is 1/2 of one percent of the total BLM land in the Study Area and is not considered to be a significant cumulative impact. No locally significant impacts to vegetation were identified after mitigation.

Impacts to riparian and wetland habitats would not be significant. Development within these critical areas will be avoided by use of a Controlled Surface Use stipulation, where necessary, and by developing Conditions of Approval (COAs) during predrill inspections. Well site locations could be moved up to 200 meters to avoid construction in riparian and wetland areas.

To comply with requirements of the Endangered Species Act, all oil and gas activities would be cleared for species occurrence at the operational stage on a case-by-case basis rather than at the leasing stage. This ensures that each site with the potential for threatened and endangered (T&E) species would be inventoried and site locations changed to avoid any discovered species. Locations larger than 40 acres with known T&E (or candidate) species are protected with No Surface Occupancy stipulations on the lease. Short of no leasing, the No Surface Occupancy stipulation is the only method of protecting the large (40 acres or more) areas of known populations and high concentrations.

It has been determined through analysis that the Proposed Action Alternative will not have an effect on any of the threatened or endangered species found in the Study Area.

On split estate lands, the vegetation impacts could be more significant. Reclamation requirements on private surface lands are negotiated with the landowner and the oil and gas operator. For this reason, there is no certainty that the land would be returned to its former condition. In the absence of successful reclamation, these damaged areas could become infested with noxious, poisonous, or other undesirable weeds. Erosion and sedimentation could also increase considerably. BLM also has the

authority and responsibility to require reclamation if the private surface owner requests assistance or if negative impacts are expected even though they will not affect BLM lands.

LIVESTOCK GRAZING

All Alternatives

Seismic activities have the potential to affect subsurface water flows if activities are conducted too close to existing springs and water wells. Vibroseis operations can easily operate at distances of 300 feet without damage to the resource. Operations using large explosive charges, greater than 40 pounds, can typically occur at a distance of 1/4 mile while small charges can be allowed even closer. All of these operations could be considered at closer distances if the contractor can demonstrate the resource will be protected.

An Application for Permit to Drill (APD) condition requiring cattle guards to be installed in fences leading into pastures would prevent livestock from wandering out whenever gates are left open during extensive truck or equipment activity. Increased traffic deaths are more likely with sheep than with cattle.

Temporary forage loss would continue as long as the access roads and drill pads were in use. However, APD conditions for reclamation requiring recontouring and revegetation of these sites would restore forage production. The revegetation process would include eliminating livestock use for up to two growing seasons. This could cause a disruption in the normal grazing use of an area. The severity of the disruption depends upon each specific situation. Poisonous or noxious weeds introduced during the drilling operations could be eliminated through APD conditions requiring their control.

The potential development of livestock water encountered during the drilling operations could be ensured through APD Conditions of Approval that require BLM notification of any aquifers which have the potential for development. APD Conditions of Approval can provide water to the BLM for development as a livestock water well.

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If full development occurred in the Study Area, as described in Chapter 2, 1,800 animal unit months (AUM) of livestock forage could be lost over the 20 years. This is only 1/2 of one percent of the total for the Study Area and is considered insignificant.

WILDLIFE

Proposed Action Alternative

Impacts to fish and wildlife from oil and gas leasing and subsequent geophysical exploration and oil and gas exploration and development are categorized as either direct or indirect. Direct impacts consist of actions that affect individual fish and wildlife animals and result in immediate mortality, such as vehicle collisions and the destruction of a nest when occupied by young animals. Indirect impacts are activities that affect animal behavior, animal dispersion, or a reduction in habitat quality and quantity.

The indirect impacts resulting in the loss of habitat through oil and gas leasing and associated surface disturbance over a 20-year period is estimated at 17,900 acres. The total disturbed acres in any given year is dependent upon the amount of oil and gas exploration and development. If oil and gas activities are scattered over a large area and outside of crucial habitat areas, the total disturbed acres in any given year would not, by itself, have an significant impact. If oil and gas activities were concentrated in a small area over an extended period, detectable significant impacts would be anticipated. Field development with a concentrated number of wells could cause significant direct and indirect impacts.

The magnitude of the impacts is dependent upon the time of year, location, amount of surface disturbance, sensitivity of the wildlife species involved, and duration of human activities associated with oil and gas development and operation. Oil and gas activities may have an additional subtle but important effect on wildlife often overlooked during impact assessment (Bromley 1985). Deviations from normal activity patterns and habitat use may have profound effects on the energy budget, and therefore, the welfare and productivity of an animal (Burton and Hudson, 1978 in Bromley 1985). Negative effects of environmental disruptions (flight, avoidance, interference with movement) raise

the energy cost of living at the expense of energy needed for reproduction and growth (Geist 1970 in Bromley 1985). These effects would be most significant during the breeding, nesting, raising of young, and critical seasons (winter, spring) when animals are already under substantial stress.

Several measures can be taken to avoid and minimize wildlife impacts from oil and gas exploration and development activities. Mitigation by avoidance can be used to restrict activities during a sensitive or critical portion of an animal life cycle in the form of seasonal lease stipulations. Oil and gas development and production activities cause habitat losses, shifts in distribution, and long-term displacement which could affect wildlife populations. To make energy development and fish and wildlife habitat resources compatible, consideration is given to minimize impacts on fish and wildlife crucial or sensitive areas through the use of special timing limitation stipulations and Conditions of Approval. Appendix E contains specific wildlife mitigation in the form of lease stipulations applicable to all five Resource Areas. Other forms of mitigation are reclamation, replacement of habitats, habitat improvement, and impact minimization in unavoidable situations. Appendices D and F contain the COAs that will be utilized to minimize wildlife and fisheries impacts for threatened and endangered species, and to protect sensitive and crucial habitats when appropriate. Some activities associated with oil and gas may not be mitigated in the short term and residual impacts may persist despite mitigative efforts.

Protection of perennial water impoundments and streams, and/or the riparian vegetational zone is very critical. Riparian and wetlands represent less than one percent of the total BLM-managed lands in the state and are the most productive and important ecosystem found on the public lands. Disruptions or loss of riparian vegetation or systems would have an accumulative effect on all other resource uses and values. Characteristically, riparian and wetland areas display greater plant and animal diversity than other adjoining ecosystem. It is estimated that 80 percent of the fish and wildlife species found on public land are dependent on these crucial habitat areas for shelter, escape cover, food, nesting, raising young, and other biological functions as well as migratory corridors.

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Healthy riparian systems are also recognized for filtering out sediments, purifying water, and contributing to aquifer recharge and flows.

To protect riparian systems, a Condition of Approval on proposed operations would be applied to restrict oil and gas exploration and development activities to an area beyond the riparian vegetation zone. A Controlled Surface Use stipulation would be applied to protect riparian areas when relocation up to 200 meters would not provide adequate riparian and wetland resource protection because of the juxtaposition of steep slopes and/or erosive soils are located within the acceptable area of granting rights-of-way for roads, pipelines, and storage facilities.

Impacts to wildlife including aquatic habitat under this alternative should be insignificant with the application of all appropriate mitigation listed in Appendices D, E, and F. Although impacts are thought to be insignificant, there would be some unavoidable loss of important habitat in localized areas with significant impacts to individual animals within a fish and wildlife population. Harassment of wildlife would be expected to increase with oil and gas exploration and development. Road closures would reduce but not eliminate disturbance to wildlife because of use of the roads through oil and gas activities.

Big Game

Disturbances associated with seismographic activity during noncritical periods of an animal's life cycle seldom cause significant impacts. Seismic activities are of short duration with minimal habitat disturbance. Affected animals are temporarily displaced and normally return after the activity ceased with no mortality expected or any other permanent adverse consequences. Seismic work associated with helicopters and blasting during critical periods of an animal's life cycle (i.e., birthing and wintering areas) would have a greater impact by forcing the animals to disperse into marginal habitat. In crucial winter habitat areas, surface explosions along with an increase in vehicular traffic or helicopter usage could result in displacement of big game animals from preferred feeding areas. Additional movements during critical winter periods produces stress that could affect population

dynamics (Stubbs and Markham 1979 in Hay 1985). Female big game animals with young appear to be more restricted than other groups with high potential for increased mortality due to predation, accidents, or diseases if movements are frequent and unusual (Knight 1980).

Impacts from exploratory drilling would be somewhat more pronounced than seismic because the period of disturbance is longer, causing greater periods of avoidance and displacement. Animals could be displaced from traditional use areas into marginal habitat areas along with decreased survival of young. Studies of elk response to oil well drilling activities are inconclusive with some indication that elk are displaced away from the activities (Johnson and Lockman 1980) and that elk become habituated to the activity (Knight 1980). In a CO₂ development project in Colorado, a significant shift occurred in elk distribution around the drill sites which were located within an elk calving area (Brekke 1988). Smith and Bloomfield 1980, (in Hay 1985) reported increased harassment of big game animals on areas critical to breeding, reproduction, or survival during stress periods in Alberta.

Oil and gas development and production within big game crucial winter habitat and birthing habitat has the greatest potential for impacts through both loss of habitat and displacement of animals during critical stress periods. Because drilling activity would be restricted to noncritical periods and outside of designated management areas through seasonal limitation stipulations, disturbance to wildlife would be minimized. Avoidance and no occupancy in crucial habitats during sensitive periods in big game species' life cycle are recommended to reduce intense stress (Stubbs and Markham 1979; Smith and Bloomfield 1980; Washington Dept. of Game 1980; USDI-BLM 1979; USDA-Forest Service 1982; in Hay 1985) (Hurley and Irwin 1985) (Irby et al., 1987) (Brekke 1988).

Some loss of habitat, such as that resulting from a single producing or exploratory well, is not expected to cause a significant impact when proposed seasonal restrictions and stipulations are implemented. The continual human activities and associated facilities with several producing wells could have a significant impact, depending on the type and

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level of activity, the habitat affected, geography, and other pertinent factors. These impacts will be reduced or eliminated by the combination of timing limitation stipulations and other mitigation possible through application and enforcement of the standard lease terms and the regulations. Subsequent mitigation would be identified from the environmental analysis conducted on APDs or completed for the development of a field. Such mitigation might include: relocation of surface disturbing activities; co-location of surface activities to reduce habitat loss; closure of oil and gas roads to all but essential oil and gas personnel; control of the rate of development to reduce activity in a given area at any one time; and other measures determined necessary from a subsequent analysis.

Potential significant impacts for oil and gas activities on mountain lion and black bear populations would most likely be restricted localized areas. Both of these species characteristically utilize large home ranges and occur at relatively low densities.

New road construction into previously unroaded or isolated areas is another aspect of oil and gas exploration and development that could significantly impact all big game species. Such relatively undisturbed areas serve as sanctuaries in which animals can seek refuge from human activities, hence reducing stress during critical times of their life cycle. As public access to these areas becomes easier and more widespread, animals become more vulnerable to human harassment. The primary concern would be with seismic operations, wildcat wells, or new field development. Road kills of deer and elk would increase above existing levels due to increased vehicle traffic along well-traveled roads, especially those associated with field development. These potential impacts have been mitigated through the various COAs and lease stipulations found in Appendices D, E, and F.

Birds

Impacts to birds from oil and gas exploration and production activities could result in nest abandonment, destruction of nests, and elimination of essential habitat components i.e., roosting areas, prey species, shelter, breeding areas. Seismographic and drilling activities during periods of egg laying and

incubation could cause birds to abandon nests. Behavioral responses of birds are significantly influenced by increased human activity. The failure of parent birds to return to eggs or young is unpredictable (Fyfe and Olendorff 1976). The response of raptors to human interference varies for different species and individual birds of the same species. Nest abandonment is most likely to occur just prior to egg-laying. Later in the nesting cycle, in addition to abandonment, females flushing from a nest can crack eggs or injure young. Late in the nesting period, disturbance is unlikely to cause abandonment but the young birds may attempt to fly before they are ready, causing injury or death. Other problems associated with disturbance to nesting raptors include cooling or overheating of eggs, chilling of young birds, and missed feedings, as the mother remains away from the nest because of human presence.

Long-term changes in species composition could result with birds being less tolerant of disturbance over time (Anderson, et al. 1990). The differences in response to human activity among individuals within a species may also occur with some individuals tolerating or habituating to a higher level of activity than others (Anderson, et al. 1989). Implications and potential impacts to raptors are shifts in home ranges with an increase in the size of the area used and more frequent daily movements (Anderson, et al. 1990).

Raptors are very sensitive to human disturbance activity during the egg-laying and incubation, especially the ferruginous hawks (Stalmaster, et al. 1982). Disturbance during nesting could lead to nest abandonment or parents spending more time away from the nest, thereby jeopardizing survival of young (Olendorff, et al. 1980, in Hay 1985). Fraser, et al. 1979 (in Hay 1985) reported nesting bald eagles flushing from human activity at a mean distance of 457 meters, ranging from 57 meters to 991 meters. Human activity should be restricted one month prior to nest site selection to one month after hatching for the bald eagle with a no occupancy restriction within one-quarter mile radius of the occupied nest (BLM 1986 and Grier et al. 1982). Protection of bald eagle communal winter roost from all disturbances is recommended with a buffer zone of one-half mile. Depending upon the surface disturbance activity and the amount of

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visual screening between the activity and roost site, bald eagles may tolerate a lesser distance. The minimum recommended distance is one-quarter mile (Grier 1982) to one-mile buffer zone (Jenkins 1982 in Hay 1985).

Sage grouse winter and breeding seasons are the periods when significant impacts would be expected to occur. Sage grouse are almost entirely dependent upon sagebrush for food and cover, especially in the winter. Only sagebrush of a certain density, height, and type appear to be suitable as winter habitat, therefore, they are concentrated during the winter and extremely susceptible to disturbance. Braun (1987) stated that "with the discovery of oil and development of oil and gas resources, especially in the 1930s and 1940s, impacts of energy development on wildlife resources in Western North America increased. The magnitude of these impacts is mostly unknown but obviously sage grouse and other wildlife were impacted." Studies in North Park, Colorado, (Colorado Division of Wildlife, unpublished data) suggest that sage grouse populations, as measured by counting males on leks, decreased dramatically during initial stages of oil field development. The decrease is related to loss of habitat caused by site preparation, road development, and associated human activities. The effects of oil and gas exploration without development are not well studied.

Leks (courtships areas), the spatial sagebrush vegetation surrounding the lek, and wintering areas are essential habitat components in maintaining quality sage grouse habitat. A lek site is the major activity center for sage grouse during courtship, breeding, nesting, and brood rearing. A study in the Gunnison Basin (Hupp 1984) found that five radio-marked female sage grouse nested at a mean distance of 4.2 km away from the lek with a range from 0.7 to 8.2 km. Results of research by Wallestad and Pyrah in Montana (BLM 1979) showed that 68 percent of all radio-marked sage grouse hens nested within 1.5 miles of a lek, with the greatest distance being 5.7 miles. Based on these studies where the majority of sage grouse nesting occurred within a 1.5 to 2.5 mile radius of the lek, and based on recommendations for protecting nesting habitat by the Western States Sage Grouse Committee (Autenrieth, et al. 1982), any activity that disrupts

strutting or active nests could result in significant changes to the localized population and long-term changes to sage grouse populations.

Impacts to greater prairie chickens (listed as a Colorado endangered species) and their habitats can occur anytime of the year. However, the most significant impacts would occur during mating (mid-February to early June) and nesting (April to early July) in the vicinity of the leks (within a 1-1/2 mile radius). Lek sites are generally on open ridges, grassy knolls, or slight rises in topography where vegetation is sparse.

Greater prairie chickens require tall to mid-grass prairies adjacent to their leks. The majority of the nests are located in taller and denser than average grassy vegetation within 1-1/2 miles of a lek. These leks and the adjacent grasslands are essential to the continued existence of this species in Colorado.

In order to protect sage grouse and prairie chickens, a Condition of Approval will be applied to proposed operations requiring relocation to avoid nesting habitat during the nesting period. This will provide necessary protection for nesting grouse. As an early alert and to assist in the planning of operations, a lease notice will be attached to leases with leks to advise the lessees of the nesting habitat concern. The Condition of Approval will be applied wherever habitat is identified, whether or not a notice is attached to the lease. For the prevention of possible destruction of lek site, a No Surface Occupancy stipulation is required for all oil and gas exploration and development activities within one-quarter mile of the lek (BLM Wyoming 1979, and BLM Wyoming 1982 in Hay 1985).

Assessment of impacts on waterfowl, shorebirds, and other birds from oil and gas exploration and development are less known. The effects of human activities are greater than the seismic explosions and equipment noises. Activities adjacent to waterfowl nesting areas could cause nest abandonment and decreased hatching success, especially sandhill cranes, swans, and geese (Barry and Spencer 1976 in Hay 1985). Small birds, such as passerine, are not directly impacted from oil and gas activities. Indirect impacts

ENVIRONMENTAL CONSEQUENCES

could occur if isolated habitat areas are significantly altered.

No Surface Occupancy stipulations are utilized to protect major waterfowl and shorebird production areas. Timing Limitation stipulations are used to protect greater sandhill crane and white pelican nesting habitats. The Controlled Surface Use stipulation for riparian vegetation zones will also help protect habitat used by waterfowl, shorebirds, and other birds.

Aquatic Habitat

Impacts to localized riparian and aquatic habitats would result from increased sedimentation through oil and gas construction activities. Sediment would cover gravel beds on the stream bottom resulting in loss of habitat for macroinvertebrates which serve as a primary food source for most fish species. In addition, gravel beds serve as spawning areas and are necessary for successful reproduction by many fish species. Any spill of hazardous material resulting from exploration or development that ended up in a drainage would have a significant impact on fish or other animal and plant species.

Any surface disturbance activity in the riparian vegetation zone could have a significant impact. The destruction of riparian plants, alteration in drainage patterns, and water flows could reduce the usability of the habitat area by fish and wildlife species. The protection of these crucial habitat areas are being mitigated by avoidance of habitat.

Special Status Species

All oil and gas development and production activities are subjected to the provisions of the Endangered Species Act. To comply with requirements of the Endangered Species Act, all oil and gas activities would be cleared for species occurrence at the operational stage (APDs) on a case-by-case basis rather than at the leasing stage with the exception for endangered Colorado River fishes. The effects of impoundments and water depletion from the Colorado River and its tributaries would have a "may affect" finding for the listed and proposed fish species. The required consultation and conferencing under the Endangered Species Act is in progress.

The U.S. Fish and Wildlife Service (USFWS) has determined that any depletion of water in the Colorado River will further endanger listed fish species. A fund has been set up to acquire water rights for the purpose of establishing river flows which will sustain the endangered populations. The USFWS requires that any depletion, no matter how small, necessitates a contribution of \$10.23 to the fund for each acre foot of water deleted from the drainage.

The USFWS has defined "depletion" as water which would contribute to the river flow if not intercepted and not returned to the system.

For the four affected Planning Areas, the BLM estimates the depletion volume to be less than 10 acre feet annually. The depletion is more than off-set by the 1,100 acre feet of nontributary formation water contributed annually to the Basin from the Isles Dome Field in the Little Snake Resource Area. Accordingly, no contributions need be made to the Colorado River Fund for oil and gas operations.

The potential exists that additional inventories will be required to document the presence or absence of special status plants. These inventories will be conducted prior to issuance of an APD where the unknown potential for special status plants to occur may exist based on soils and associated plant communities. Specific inventories may be required in oil and gas leased areas prior to any development. Provisions in the oil and gas lease provide for requiring inventories to relocate oil and gas activities to avoid threatened, endangered, and proposed listed federal species of plants and animals. Locations of previously inventoried threatened and endangered and federal candidate species are afforded protected through seasonal timing and No Surface Occupancy stipulations on the lease. It has been determined through evaluating the potential impacts from oil and gas leasing activities and with the application of stipulations that the Proposed Action would have an "no affect" on threatened and endangered species with the exception of endangered Colorado River fish.

Recovery efforts for the black-footed ferret would be conducted within the provisions of the Endangered Species Act (Sections 4, 7,

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and 10 of the Act), Black-footed Ferret Recovery Plan, and general guidelines identified in the Special Lease Notices for Oil and Gas Development, Appendix E. If additional protection is necessary in prairie dog ecosystems managed for the recovery of the black-footed ferret, additional protection measures will be developed in the Surface Use Plan of Operations as added Conditions of Approval on applications for permit to drill (APDs), Sundry Notices, and rights-of-way permits.

Continuation of Present Management Alternative

Under the Continuation of Present Management Alternative, existing protection measures for crucial wildlife and fish habitat are not as effective as they could be. As new information was received on areas with known potential for oil and gas development along with updated wildlife surveys, additional protection measures were needed to mitigate known or potential fish and wildlife impacts.

Without the additional timing limitations and No Surface Occupancy stipulations, direct and indirect impacts could result from oil and gas exploration and production activities to (1) big game species on crucial winter habitat and birthing areas during periods when these animals are most vulnerable to induced stress from human activities; (2) intrusion of human activity and oil and gas development equipment in areas of sage grouse leks (courtship areas) and nesting habitat around the lek; and (3) inadequate buffer zones around raptor nesting sites to prevent nest abandonment and mortality of young. Significant impacts could occur if the 60-day delay restriction were not long enough to cover these critical periods.

Significant impacts could result from oil and gas exploration and development activities to big game species during birthing and on crucial winter habitat areas because the timing limitations are insufficient or absent to delay activities that would reduce stress during these critical periods. The loss of crucial big game habitat could occur along with induced stress causing direct impacts on big game herd productivity and displacement into marginal habitats. The direct loss of escape cover and increased human harassment as a result of enhanced public access into remote

areas could lead to displacement and loss of solitude to those big game species that are less tolerant to human activities. Mortality could occur from increased stress as these animals strive to avoid disturbance activities.

Detrimental impacts on bird productivity could result from intolerable human-related oil and gas activities that occur within established buffer zones around nest sites. Seasonal timing and distance restrictions reduce nest abandonment and the potential destruction of habitat components needed for successful nesting and brood rearing of young for raptors, and other bird species such as sage grouse, waterfowl, and shorebirds.

Under this alternative, limited protection measures for riparian and wetland areas were considered. Disturbance in or near the riparian, wetland, and aquatic zones would have a detrimental effect on water quality and those habitat components provided for fish and wildlife species.

Oil and gas exploration and development activities would be not be permitted that would jeopardize the continued existence of threatened, endangered, and sensitive species and their habitat.

Standard Terms and Conditions Alternative

Wildlife habitat would be protected from disturbance under the standard lease terms by specific conditions applied to oil and gas activities (APDs, rights-of-way, and seismic notices of intent) at the time of permit application. The types of mitigation measures would depend upon the specific habitat and project proposal involved. The locations of fish and wildlife habitat will be protected from human-induced surface-disturbing activities to the extent such protection does not unduly hinder or preclude the exercise of valid existing rights. The area of protection will include the actual locations and, if present, adjacent sites critical to the habitat or species in question. Crucial habitats of special status species, upon which analysis determines protection to be necessary, shall be protected by requiring relocation or rerouting of proposed well sites, pipelines, roads, and other surface facilities.

ENVIRONMENTAL CONSEQUENCES

Standard lease terms would not allow BLM to mitigate all of the most detrimental impacts to crucial fish and wildlife habitat from oil and gas development. Detrimental impacts that could occur under this alternative include: (1) disturbance to big game birthing habitat and crucial winter range habitat; (2) new road construction into unroaded or isolated areas; (3) disturbance to sage grouse leks, nesting habitat, and winter habitats; (4) disturbance to nesting raptors, waterfowl, and great blue heron; (5) impacts to aquatic and riparian/wetlands. Significant impacts resulting from oil and gas development could occur to big game species during their birthing season and during the crucial winter seasons if the 60-day delay restriction were not long enough to cover these periods. Increased stress and harassment on big game species would occur without seasonal limitation protection during the winter months. Crucial winter range habitat would be lost without replacement.

New road construction into unroaded or isolated areas would cause loss of escape cover and result in increased legal and illegal harvest of game animals. This could lead to significant long-term losses to all fish and wildlife species and their habitat. Areas with seasonal road closures that restrict public access may help control animal harassment. Oil and gas development within crucial winter habitat could result in both loss of habitat and displacement of animals. Small losses of habitat, such as that resulting from a single exploratory well, would not have a significant effect on the availability of crucial habitat. However, the cumulative impact of this action, in conjunction with other unrelated activities, could have locally significant impacts.

Field development, on the other hand, could result in substantial loss of habitat and disturbance would occur during the critical winter period. Mortality could result from the increased stress as animals attempt to avoid disturbance. Oil and gas development within traditional big game calving or fawning areas would cause animals to move to adjacent marginal habitat. Traditional areas are preferred because of the existence of optimal conditions for the highest rate of survival of newborn animals. Many of the displaced animals would probably proceed with calving or fawning in marginal habitat; however, increased mortality of newborn

animals would be significant. Disturbance to sage grouse winter, nesting, breeding, and brood rearing habitat could result in significant impacts to sage grouse leks and nesting habitat. The breeding complex area (lek and nesting habitat) needs to be protected along with crucial winter habitat to afford adequate protection to sage grouse. Maintenance of the sage grouse habitat under this alternative would be significantly impacted. Disturbance to nesting raptors could result in significant long-term reductions in raptor production and populations.

Conclusions

Significant unavoidable adverse impacts could occur under the Standard Terms and Conditions Alternative. Substantial long-term cumulative population losses would be expected for big game, sage grouse, waterfowl, great blue heron, and raptors because of disturbance to crucial habitat during the winter and breeding seasons. Population losses of fish and wildlife species would affect recreational related opportunities such as hunting and wildlife viewing. This, in turn, would affect local and regional economics dependent upon these recreational related opportunities and tourism. Seasonal stipulations in the Continuation of Present Management and Proposed Action Alternatives could reduce impacts of oil and gas activities to the aforementioned species or habitat. Impacts to big game species through construction of roads into isolated or previous roadless areas could result in increased stress on these animals during critical phases of the animal's life cycle from human presence and harassment along with habitat disturbance. Mitigation to reduce these potential impacts are identified under the Proposed Action Alternative but would remain unchanged under the Continuation of Present Management Alternative.

Under all alternatives, unavoidable adverse impacts could result from disturbance to crucial habitats. Through implementation of the mitigation measures under the Proposed Action Alternative, these adverse impacts are insignificant. The proximity and density of surface disturbance and the continuous human harassment in an oil field development make it impossible to mitigate all impacts. In this situation, some long-term loss and irreversible and irretrievable commitments of

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wildlife resources would occur, but no significant losses in wildlife populations or habitat would be expected. The accumulation of short-term impact disturbances could potentially impact the long-term productivity for most wildlife species. Unavoidable adverse impacts could also occur where protection measures are inadequate or impacts are unknown. This situation could be reduced by monitoring restrictions and conducting on-site inspection of all APDs.

WILD HORSES

General

Wild horses try to avoid motor vehicle movement and human activities within their range. It is logical to assume that they would continue this behavior and that the effect on their patterns of movement and areas of preferred habitat would relate directly to the magnitude of the disturbance and development activity.

During winter months, oil and gas development could have significant impacts on wild horses. Traffic and drilling activities could force the wild horses into less desirable grazing areas resulting in increased winter kills and lowered foaling percentages. The severity of the impacts would depend on the amount of drilling conducted in the winter.

An increase in oil and gas activity within the wild horse range would result in a reduction in the quantity and quality of their forage and habitat. Development of oil and gas facilities would reduce available forage as well as allow for less palatable forage for the wild horses. For every ten surface acres disturbed on the wild horse range, approximately one AUM of forage would be lost. This would not be significant with the expected level of development and reclamation.

Living space for the wild horses would be reduced by the actual number of surface acres disturbed and cleared. Development of areas around watering sites, south slopes, and windswept ridges, which are areas of high wild horse winter concentration, would impact the wild horses to a greater extent than development in other areas. As the available habitat is reduced, competition for the remaining habitat would increase between wild horses, livestock, and wildlife. Increased competition would result in:

(1) a decrease in either the number of large herbivores, or (2) overgrazed range land, or (3) both. With reclamation practices, this should not be significant. Increased wild horse roundups may be necessary to keep the wild horse herds closer to the herd level objectives.

Proposed Action Alternative

Little Snake Resource Area

The Proposed Action Alternative would allow the wild horse herd continued use of its watering areas by restricting the location of oil and gas development activities, or providing water where it could be used by the horses. The application of these mitigations would protect the herd from seismic exploration and wildcat exploration wells. Should a field be discovered, some impacts may still occur to the herd from that level of human activity. Increased road access could result in impacts similar to those identified for big game.

San Juan/San Miguel Planning Area

All Alternatives

A wild horse herd, averaging 50 head, will be maintained in the Spring Creek Herd Management Area. The reproductive season is a crucial period in the life cycle of these animals. Disturbances during this period may create unnecessary stress and reduce herd productivity. In order to minimize effects on the horse herd during foaling periods, a seasonal stipulation will be attached to any newly issued leases. (See Appendix E.)

The following types of mitigation would be applied as conditions of APD approval:

- Avoidance conditions to avoid water sources used by wild horses.
- Surface disturbance would be kept to the minimum necessary for oil and gas exploration and development.
- All pits would be fenced to prevent entry by the horses.
- Avoidance conditions would locate exploration and development activities away from windswept ridges and pinyon-juniper

areas. This will help to assure availability of winter forage and year-round shelter.

Operational conditions such as, but not limited to, those outlined above would be applied to seismic exploration activities as well, if necessary.

Continuation of Present Management and Standard Terms and Conditions Alternatives

Potential impacts to the wild horse herd would remain under these alternatives. Loss of winter forage and shelter would result when windswept ridges and pinon-juniper areas would not be avoided under the standard terms of the oil and gas lease. An increase in human activity would not be mitigated under this alternative because traffic and drilling operations throughout the year would force horses into less productive grazing areas.

Conclusions

Any impediment to free movement within the wild horse herd area is a significant adverse impact. Wild horse movement would be affected by oil and gas activities and facilities, also by the increase in vehicle and human activity associated with the oil and gas activities. Disturbance in areas preferred by wild horses would have the greatest impact within their established traditional range. Horses may abandon their traditional patterns of movement and areas of preferred habitat in order to avoid human activities. Since the wild horses occupy the most desirable areas for wild horse habitation, oil and gas exploration and development activities in these areas would force wild horse bands into less desirable areas.

Oil and gas development activities would result in short-term abandonment of wild horse habitat in and adjacent to the development site during exploration. Long-term abandonment would result if production is obtained and permanent facilities were installed. In general, impacts from individual or wildcat wells would be not impact long-term productivity.

SOILS

All Alternatives

Exploration and field development will have a direct impact on soils physically disturbed. This would be limited primarily to those areas where vegetation is removed or destroyed. The impacts would be of three types: (1) physical removal, mixing, or burying of surface soils, (2) damage or destruction of soil properties in place, or (3) drilling and production wastes are mixed into the soil.

The first impact would be caused by site preparation for well pads, related structures, roads, excessive erosion, and slope failures. This would destroy the soil texture, mix the soil horizons, and cause a short-term reduction in the potential productivity of the soils. Revegetating these disturbed areas would initiate the process of creating new soil structure and soil horizons. The revegetation rate will probably be slow due to low rain fall. The initial soil productivity would be influenced by organic matter incorporated in the mix, the length of storage before revegetation, and health of soil microflora.

The second impact would be soil compaction. This would be caused by vehicle or machinery travel with wide ranges in the amount of compaction. The compaction would decrease water and air infiltration into the soil profile, and thus, reduce soil productivity. Where compaction is severe, soil vegetative productivity would be virtually eliminated in the short term without mechanical treatment to reduce the compaction.

Minor short-term losses to soils would occur because of erosion. These short-term losses are lessened in magnitude by reclamation measures. These short-term impacts, as well as specific soil problem areas, are protected through COAs utilized on specific exploration and development authorizations. Specific reclamation measures (such as waterbarring, contouring, seeding, etc.) would be developed and applied on a site-specific basis. These COAs would mitigate impacts to soil resources to insignificant levels. Most of the adverse impacts to soil resources would be mitigated by applying the present COAs.

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The third impact that could occur is when drilling fluids, mud, additives, etc., are mixed with the soils during backfilling and reclamation. If these substances are mixed into the rooting zone of the plants, they could inhibit the plants from reaching their full potential. If the mixing is severe, plant growth could be severely limited. During the production phase, the discharge of saline water into the soils or drainages could result in elevated levels of salt which would lead to changes in the vegetative community, or in severe cases, loss of all vegetative cover. Losses of vegetative cover could result in increased erosion and sedimentation. The Condition of Approval that governs the disposal of drilling fluids will prevent the above described impacts.

Proposed Action and Continuation of Present Management Alternatives

In LSRA, large areas of fragile soils occur in existing oil and gas fields. With no BLM-imposed surface restrictions, future oil and gas development is expected on the fragile areas. Based on the reasonably foreseeable level of development (RFD) assumptions, approximately 15 percent of new development could occur in major fragile soil areas, including the Danforth Hills, Temple Canyon, Maudlin Gulch, Wilson Creek, and areas within the Vermillion Creek watershed. Fifteen percent would equate to approximately 39 new development wells and 44 exploration wells, or a total of 1,853 acres of new disturbance over a 20-year period. The actual disturbance could be more or less depending on the existence and discovery of oil or gas resources.

Disturbance of 1,853 acres on fragile soils would be a significant adverse impact in terms of soil productivity loss and in soil loss itself. A typical undisturbed side slope in the Vermillion Creek area has a soil loss rate of approximately 1.6 tons/acre/year. After disturbance, assuming all the vegetation has been removed, the rate of soil loss would increase to about 4.7 tons/acre/year. Likewise, a typical side slope in the Danforth Hills area would undergo an increase in soil erosion rates, from 0.6 tons/acre/year to 5.0 tons/acre/year, due to surface disturbance. These soil erosion rates are most likely underestimated for potential erosion increase because they do not take into account the

massive types of erosion activity, such as landsliding, gullyng, and soil piping, which normally take place on fragile soils. If these assumptions are correct, soil erosion might be increased by as much as 3.5 percent within the 200,000 acre fragile soil areas.

This impact is mitigated under the Continuation of Present Management and Proposed Action Alternatives through the use of performance objectives attached to the lease.

The performance objectives are as follows:

- I. Maintain the soil productivity of the site.
- II. Protect off-site areas by preventing accelerated erosion (such as landsliding, gullyng, rilling, piping, etc.) from occurring.
- III. Protect water quality and quantity of adjacent surface groundwater sources.
- IV. Select the best possible site for development in order to reduce the impact to the soil and water resources.

Although surface disturbances associated with oil and gas activities will cause unavoidable adverse impacts in the form of increased erosion rates, many of the impacts would be mitigated by erosion control COAs. With careful application of the COAs, soil erosion can be effectively controlled on nonfragile sites under all the alternatives.

In addition to the impacts outlined above, slope angle is a critical factor in well site and road location. As slope angle increases, there is greater potential for erosion and mass wasting. Slopes greater than 40 percent (e.g., four feet of rise in 10 feet of run) are considered critical in terms of increased erosion and potential for soil instability for construction purposes. A Controlled Surface Use stipulation is attached to many leases under current management and under the Proposed Action alternative would be attached to all leases in the Study Area. The stipulation requires special construction techniques be applied to all construction on slopes of 40 percent or greater.

Standard Terms and Conditions Alternative

Under this alternative, fragile soils, particularly those occurring adjacent to existing development fields, would not be protected, resulting in irreversible and irretrievable soil losses. In addition, long-term productivity of the soil would be lost on these sites. The loss of soil and site productivity in fragile areas would be a highly significant impact.

WATER

All Alternatives

Activities associated with oil and gas exploration and development could have adverse impacts on surface waters. The most adverse impacts would probably occur in perennial streams within or adjacent to fragile soil areas. High rates of soil erosion from disturbance of fragile sites would result in increased sediment and salinity loads within the affected streams. Increases in sediment loads would also lead to increases in stream bank erosion and instability. Although the increases in sediment and salinity yields from surface disturbances cannot be calculated, it is believed that they would be adverse and long-term, based on magnitude of soil erosion that could occur from these activities. Current Colorado Department of Health water quality standards for chlorides and sulphates could be exceeded if high increases in salinity occurred.

Outside of the fragile soil areas, short- and long-term adverse impacts to surface waters would occur from surface disturbances associated with oil and gas wells. Again, impacts would consist mainly of increases in sediment and salinity loads from the erosion of barren surfaces. Because exploration well sites would be reclaimed within a three-year period, sediment and salinity increases generally would be short term and not significant. Long-term sediment and salinity increases would result in field development situations from barren areas (mainly roads and pads). Disruption of normal flows from wells and springs could occur from seismic activity in close proximity to the well or spring. This flow disruption could either be an increase or decrease.

Waste fluids associated with oil and gas operations would present another potentially adverse impact to surface waters. Reserve pit and/or produced water fluids could percolate from unlined pits into nearby surface waters, possibly degrading water quality. Occasionally reserve pit fluids may contain very small amounts of toxic elements used in drilling muds, such as chromium (hexavalent) and other heavy metals. Handling, use, and disposal of any and all hazardous or toxic substances must be in accordance with the applicable regulatory requirements. Other agencies such as EPA, OSHA, and State Health Department have standards and guidelines as to the proper handling of these materials. Note that drilling and production fluids are exempt from the Resource Conservation and Recovery Act (RCRA), but not necessarily from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Nothing required by BLM shall reduce or remove those standards. Proper disposition of those types of materials is expected. Drilling fluids may also have high salt concentrations. Produced waters may contain high concentrations of salts (particularly sodium and chloride), heavy metals, and aromatic hydrocarbons such as benzene and toluene.

If these fluids contaminate the subsoils, the capillary action (upward) movement of these fluids could evaporate on the surface leaving salts on the surface.

The Potential of Development (Appendix B) estimates that 1,339 oil and gas wells will be drilled over the next 20 years. This could disturb 17,900 acres over the same period. Depending on the proximity of these disturbed areas to the surface waters in the Study Area, sedimentation and possibly salinity impacts could occur degrading water quality. Further water quality impacts could occur from reserve pit and/or produced water leakage and percolation. However, specific impacts to water resources are determined by individual analysis of the drill sites and other operations. With the application of COAs to individual field operations, these impacts are minimized or eliminated.

Shallow groundwater may also be affected by the drilling of water source wells and monitoring wells, cathodic protection holes, geophysical shot holes, and core test holes.

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All of these holes must be so constructed as to preclude the interzonal migration (cross-flow) of fluids from one zone to another. In general, this is achieved through proper casing, grouting, and plugging designs. Any well bores which allow interzonal flows or artesian flows to the surface are required to be repaired or properly plugged immediately.

Oil and gas operators are regulated to protect freshwater zones with a total dissolved solids (TDS) concentration of 10,000 mg/l or less. This is generally accomplished by correct placement of casing, cement, packers, and/or other downhole devices.

Recent increased coal-bed methane development in GSRA, LSRA, and SJ/SMPA has given rise to environmental issues related to groundwater: including the effects of withdrawing water from the coal seams, the need to dispose of that water, and the liberation of absorbed gas which becomes free to migrate.

The presence of hydrocarbons has been detected in shallow aquifers just south of the SJ/SMPA in the vicinity of Bonadad, Colorado, and Cedar Hill, New Mexico. Currently it is not known if the contamination is naturally occurring or man-induced. Several entities are currently conducting studies of the area to attempt to ascertain the extent of the contamination and its source(s). The potential for hydrocarbon and saltwater contamination of shallow aquifers by migration through improperly installed or deteriorating well casing exists anywhere wells are drilled. Sound operating practices (see Appendix A) generally preclude the undesirable migration of fluids in well bores. Occasionally, however, problems do arise which jeopardize or breach the integrity of a well bore. When problems are suspected through monitoring or detected by undesirable impacts, remedial work becomes necessary. Current regulations and onshore orders require prompt reparative action whenever a problem is documented for a well or facility for which BLM has responsibility.

Development of coal-bed methane wells generally includes withdrawal of appreciable amounts of water from sub-surface coal seams (beds). If shallow aquifers above are in communication with the coal beds, some depletion of those overlying aquifers may occur. In the San Juan Basin, thick shales

which are generally impermeable lie between the coals and the shallow aquifers. The presence of these shales combined with the depth differential between the coals and the overlying useable aquifers likely preclude the loss of shallow groundwater. In addition, evidence such as differences in pressure, water type, and water quality between the coal-beds and adjacent (overlying and underlying) formations, indicate that the coals are a closed geologic system and most likely are not in communication with one another. However, if communication were to exist this could be detected by analysis of the produced water which would change in quality and type to more closely resemble the shallow water composition. Additionally, minor subsidence may occur as a result of producing the coal bed waters which could serve to reduce the porosity and permeability reducing the entrance of outside waters to the coals. This potential subsidence would be minor and it is extremely doubtful that the small amount of thickness reduction due to water withdrawal and coal shrinkage effects would traverse the thick overlying strata and be expressed at the surface, or would at least be immeasurably small.

Water disposal into deep wells will not cause adverse impacts to shallow useable aquifers. Evaporation ponds are an alternative disposal method which, if properly constructed, provides an environmentally safe method of water disposal.

Proposed Action and Continuation of Present Management Alternatives

Glenwood Springs Resource Area

The Continuation of Present Management and Proposed Action Alternatives call for No Surface Occupancy leasing stipulations on 21,218 acres of public lands on the Colorado, Fryingpan, Eagle, Piney, Crystal, and Roaring Fork River corridors. Additionally, the municipal watersheds for Rifle (Beaver Creek) and New Castle (East Elk Creek) have No Surface Occupancy stipulations, as does the 7,126 acre flow hazard zone around Glenwood Springs. The watershed for two fish hatcheries also have protective stipulations. These limitations will afford adequate protection of the water resources in these areas.

ENVIRONMENTAL CONSEQUENCES

Kremmling Resource Area

The Colorado River corridor is unavailable for leasing.

Little Snake Resource Area

The Continuation of Present Management and Proposed Action Alternatives call for a Controlled Surface Use lease stipulation to protect fragile soil areas. This stipulation, with its performance standards, would protect surface waters from sediment and salinity impacts associated with surface disturbance on these specific soils (see Soils section).

Northeast Planning Area

No Surface Occupancy stipulations would protect reservoir rights-of-way and riparian zones under both the Continuation of Present Management and Proposed Action Alternatives.

FORESTRY

All Alternatives

Road and well pad development could have both beneficial and adverse impacts on forest resources. Beneficial impacts could include construction of access roads to forested stands which were previously inaccessible and the replacement of old, decadent trees by young, vigorous seedlings, possibly of a more desirable species. Adverse impacts would result from the long-term removal of forested tracts from timber and woodland production. Increased demand could be placed on the forested areas for products like fuel wood, posts and poles, and Christmas trees. Increased trespass for harvesting of these same products would also be anticipated.

Construction or improvement of access roads in the well field to areas which are proposed or which have the potential, for future forest product harvest would reduce the costs of commercial logging operations on these tracts. Due to the relatively high cost of road construction and the small size of some sales, well field road construction would result in a significant cost savings to the lumber and fuel wood industry for commercial harvesting in these areas.

Road, well pad, and gathering line construction in the well field would remove forest resources. Assuming that all forest products removed would be recovered and utilized, these changes in forest resources would not result in significant adverse impacts to forest economics. If local loggers are given the clearing work, the local forest industry would receive a beneficial economic impact.

Long-term productivity, however, would be slightly reduced by the semi-permanent nature of well field operations in forested areas. Reclamation of well pads and right-of-way corridors from construction to operational widths would help mitigate this long-term effect, but on some forest and woodland sites regeneration would be unlikely. On favorable sites, it would take between 75 and 100 years in commercial forest lands and up to 200 years in pinyon-juniper woodlands for trees to attain harvestable size in the reclaimed areas. This is not considered to be significant.

It is estimated that no more than one percent of the forest land or woodlands in the Study Area will be impacted by oil and gas development activities during the 20-year planning period.

RECREATION

Proposed Action Alternative

Exploration and most drilling activities would have relatively insignificant and short-term impacts on recreationists. The exception would be in fields where intensive oil and gas development occurs. In developed oil and gas fields, permanent support facilities would tend to cause a shift from resource-dependent recreation (primitive) to facility-dependent recreation (modern urban). The primitive and semi-primitive recreation settings would never return to their original settings, even with rehabilitation. The cumulative effect would be a decline in the area available to users who prefer undeveloped settings and an increase in area to users who prefer more developed types of settings in which to engage in various activities. Providing physical access to areas currently isolated from public use would help offset some of the loss of area and would generally be considered a benefit except in areas being managed to provide primitive and semi-

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primitive nonmotorized recreation. Some undeveloped campsites may be affected by placement of oil and gas facilities. These impacts would be important to those users who prefer primitive and semi-primitive settings to engage in such activities as hunting, hiking, viewing, floatboating, and backpacking, but would only occur in and near those areas where field development occurs.

Field development is anticipated to occupy less than five percent of the land within each Resource and Planning Area.

Glenwood Springs Resource Area

The semi-primitive nonmotorized area around Sunlight Peak may be affected by road construction if fields develop nearby. The high increase in vehicle traffic, and human presence will reduce the semi-primitive qualities such as isolation, low amounts of noise, and low density of human activity.

The No Surface Occupancy stipulation would prevent impacts to recreation and visual values. This stipulation would also prevent impacts to caves found in the upper strata of the cave bearing formation: cave resource values which may exist below the subsurface elevation of 5,600 feet would not be protected.

Kremmling Resource Area

No disturbance is projected and impacts to recreation are unlikely in POD area 1. In POD areas 2 and 3, a disturbance of 73 acres at any given time would not interfere with dispersed recreation. In POD area 4, a projected disturbance of 1,090 acres at any one time would normally present an impact to recreational use, however, existing recreational use in this area is presently minimal and dispersed. Activities that would be displaced are driving off-highway vehicles (OHVs), and antelope and small game hunting. COAs would not be adequate to mitigate impacts on public lands within the Upper Colorado River SMRA and North Sand Hills SMRA. SRMAs would be protected with No Surface Occupancy stipulations and only adjacent lands would be subject to development.

Little Snake Resource Area

Adverse impacts to recreational settings could be mitigated to an acceptable level with the use of appropriate COAs designed to minimize impacts to recreational values. These include ensuring that key access routes previously available to the user public are not unnecessarily blocked, and in certain situations, arranging for the retention of access roads in the abandonment phase where such retention would provide public access to previously inaccessible areas. No Surface Occupancy stipulations would protect the Little Yampa/Juniper Canyon Special Recreation Management Area (SRMA), the Cedar Mountain unit, Steamboat Lake State Park, and Pearl Lake State Recreation Area.

Northeast Planning Area

Special stipulations requiring No Surface Occupancy within major reservoir rights-of-way and a seasonal closure at Sterling Reservoir will protect the major intensive recreation areas in the medium to high potential areas. Since most drilling is expected to occur on split estate lands, hunting and viewing wildlife are the only recreational activities that may be impacted. Field development could cause big game species to discontinue using the area, and local hunting success and viewing opportunities would decrease.

San Juan/San Miguel Planning Area

Adverse impacts from oil and gas activities are not anticipated. Intensively used recreation areas such as the public lands along the Dolores River and the Dolores River Canyon Wilderness Study Area (WSA) are protected with a No Surface Occupancy stipulation. Similarly, the Weber and Menefee Mountains primitive recreation areas are protected by their WSA status, which if they are not designated wilderness, would revert to No Surface Occupancy. The Tabeguache Canyon Outstanding Natural Area (ONA) and the Tabeguache Pueblo are protected from adverse impact by No Surface Occupancy stipulations.

ENVIRONMENTAL CONSEQUENCES

Continuation of Present Management Alternative

Impacts from this alternative would be the same as those described under the Proposed Action Alternative with the exception of that shown below.

Glenwood Springs Resource Area

The existing No Surface Occupancy does not encompass portions of the area with outstanding recreation, visual, and cave resource values, and therefore, some of these values would not be protected from oil and gas activities. Additionally, No Surface Occupancy would not protect caves because slant drilling into the area's subsurface would occur from outside the NSO boundary.

Standard Terms and Conditions Alternative

Glenwood Springs Resource Area

Impacts would be similar to those described for the Proposed Action Alternative. Exploration and development activities in Field #8 in the headwaters of Thompson Creek could increase erosion which could increase sedimentation downstream in the Thompson Creek Area of Critical Environmental Concern (ACEC), possibly affecting the aquatic habitat and degrading the recreational fishing opportunities in the stream. Field development is not expected to occur in the other SRMAs within the Resource Area, so adverse impacts to recreationists are unlikely.

Kremmling Resource Area

Impacts to recreationists would be the same as described for the Proposed Action Alternative with the following additions.

North Sand Hills

The North Sand Hills SRMA is within POD area 2 where 22 wells are projected with a disturbance of 232 acres over the next 20 years. Should the projected 57 acres of disturbance at any one time be located within the SRMA, impacts to the recreation setting and experience would be significant. In the long term, vehicle access may be increased with the construction of roads associated with oil and gas development, but areas now

intensively used for camping, hunting, and operating off-highway vehicles (OHVs) would be lost to oil and gas development and activity. Impacts to scenic values, causing a shift from semi-primitive motorized to a modern urban setting would cause a decline in use from 6,000 OHV visits and 1,000 camping visits to less than 500 OHV and 50 camping visits. This would not only cause a loss of unique recreational opportunities available in the North Sand Hills, but would increase pressure and lead to significant impacts on the East Sand Hills Natural Area which is managed by the Colorado State Department of Parks and Outdoor Recreation. Enforcement and compliance with an existing OHV closure in the East Sand Hills would be difficult due to the loss of motorized recreational opportunities in BLM's North Sand Hills. Conflicts between nonmotorized recreationists who presently use the East Sand Hills and motorized recreationists who presently use North Sand Hills would increase as both user groups are concentrated into the East Sand Hills Natural Area. Problems associated with access to East Sand Hills would occur since the most reasonable vehicle route involves access through a privately owned ranch.

Upon completion and termination of oil and gas development in the North Sand Hills, reclamation would not be totally successful in returning the area to its natural semi-primitive setting. Some visual impacts and modifications to the landscape would be permanent, causing a loss of recreational opportunities. Visitor use could return to predevelopment levels, but the experience would change from the undeveloped (semi-primitive) to the developed (rural or urban). COAs would not mitigate anticipated impacts.

Upper Colorado River

The Upper Colorado River SRMA is within POD area 1 where no wells or disturbance are projected over the next 20 years. However, public lands would remain open to leasing and there is potential for surface disturbance.

Depending upon the location and type of development, impacts to recreation resources could be significant. Public lands adjacent to the Upper Colorado River receive intensive use, primarily during the spring and summer floatboating and fishing season. Intensive oil and gas development could cause a shift from

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semi-primitive and roaded-open-county settings and experiences to those of rural and modern urban.

Little Snake Resource Area

Impacts would be similar to those described for the Proposed Action Alternative. Adverse impacts to changes in recreational settings could be mitigated to an acceptable level except in Little Yampa/Juniper Canyon SRMA, the Cedar Mountain area, Steamboat Lake State Park, and Pearl Lake State Recreation Area. Impacts caused by oil and gas development could degrade the values which qualified these areas for special recreation management emphasis.

Those areas impacted by oil and gas development could be lost to public recreational use for the life of the field (30-40 years). The loss of semi-primitive recreational settings and opportunities in the Little Yampa Canyon/Juniper Canyon SRMA, and the loss of settings and locally unique opportunities for environmental education, hiking, and viewing in the Cedar Mountain area, would be significant adverse impacts.

Northeast Planning Area

Impacts would be similar to those described for the Proposed Action Alternative. In addition, impacts associated with drilling could occur adjacent to the shoreline, swimming areas, campgrounds, and boat launching facilities.

San Juan/San Miguel Planning Area

Impacts would be the same as those described for the Proposed Action Alternative, except public lands protected by No Surface Occupancy stipulations could be adversely impacted should field development occur on or adjacent to them. This includes the non-WSA portion of the Dolores River, the Tabeguache Canyon O&A, and the Tabeguache Pueblo.

VISUAL

All Alternatives

Oil and gas exploration and development could have an adverse effect on the visual resources. There may be some operations

which, regardless of mitigation, may be visible. This may conflict with the management objectives in certain VRM classes. The majority of impacts on the visual resources will be insignificant and short-term. Some facilities with full field development would be considered long-term and significant, depending on the visual class.

CULTURAL

All Alternatives

Regardless of possible development levels, there are both positive and negative cumulative impacts upon cultural resources. Development of federal oil and gas resources in previously undeveloped areas would mean that more areas that have not undergone Class III survey inventory would be surveyed. This would provide more information related to past human activities in the Study Area. Oil and gas development has been a positive factor in data collection.

The use of, and adherence to, prescribed conditions will mitigate direct impacts to cultural resources. Negative aspects of development deal mainly with secondary impacts. As more development takes place, more access to otherwise inaccessible areas is created. This will increase the potential for impacts to identified and unidentified cultural resources resulting from vandalism (McAllister 1988 and Nickens, et al. 1981).

If the appropriate sequence of cultural resource management practices are followed during oil and gas development phases and for any ground-disturbing activity associated with oil and gas operations, major impacts to the cultural resources can be mitigated.

Proposed Action Alternative

The use of a No Surface Occupancy stipulation in critical cultural resource areas in KRA and SJ/SMPA would limit potential impacts. Some cultural resources are subsurface and not easily recognized on the surface. Even with a Class III survey, it is likely that the cultural resources would not be discovered until construction activities begin.

ENVIRONMENTAL CONSEQUENCES

Continuation of Present Management Alternative

The impacts to the cultural resources would be essentially the same as those described in the Proposed Action Alternative.

Standard Terms and Conditions Alternative

Under this alternative, cultural resources would be managed under the applicable laws which require that cultural resources be identified and an assessment of impacts be made prior to surface disturbance. As National Register eligible sites are discovered, impacts to them would be mitigated by avoidance or excavation and recordation.

PALEONTOLOGY

All Alternatives

Oil and gas development could disturb surface exposure of geologic formations bearing fossils. This disturbance would be in the form of a direct impact, such as a drill pad excavation or from the increased accessibility of a fossil locality by the construction of an access road. In some rare cases, the surface exposure of a formation is the last remnant of that formation. In these cases, it may be desirable to protect significant fossils within this remnant formation from disturbance. In other cases, the fossils may be distributed throughout a massive formation, but the significance of the fossils requires protection of the entire formation. In most cases, preservation of individual outcrops is unimportant, either because of the lack of significance, the wide distribution, or the absence of fossils.

Existing law will protect significant fossils from adverse impacts by oil and gas development when the fossils are identified. Oil and gas development, as with other kinds of development, will also follow the guidelines set forth in the Colorado Supplement, Number 8270, to the BLM Manual.

Under all alternatives, prior to approval of an APD, identified sites must either be proven to have no significant fossils or appropriate mitigative measures must be taken. For areas of 40 acres or less, mitigation would usually

mean avoidance of the site. If a site could not be avoided and if the disturbed area is significant, it would have to be excavated or the resource otherwise protected. This protection is provided in the Standard Terms and Conditions of all oil and gas leases. Leases in areas designed for protection would also carry a No Surface Occupancy stipulation. This stipulation is used on the Cretaceous Ammonite site in the KRA.

The small percent of unavoidable loss would be an irreversible and irretrievable commitment of the resource. The unavoidable loss is insignificant in relationship to the widespread distribution of the resource.

WILDERNESS

Proposed Action and Continuation of Present Management Alternatives

Impacts to wilderness could occur on WSAs that had leases issued prior to prohibitions against leasing in WSAs. It is considered unlikely that any development activity will occur on these leases.

Impacts to wilderness could also occur to WSAs and established wilderness areas if development activities were to take place on adjacent lands. Should development activities be proposed, the COAs would be utilized to minimize or prevent impairment of wilderness values.

A portion of the Troublesome WSA within the KRA surrounds approximately 625 acres of split estate with federal minerals. Drilling and development operations on this property would impair the wilderness qualities of the adjacent WSA and would limit future management options within the WSA. A No Lease stipulation will be utilized on the split estate to maintain the wilderness qualities of the Troublesome WSA.

Congressional designation of areas as wilderness will remove these areas from leasing as required by the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOGLRA). Areas that are not designated as wilderness will be leased in conformance with the decision made in the applicable Resource Management Plan.

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Standard Lease Terms Alternative

The impacts of this alternative will be the same as described above until Congress designates wilderness areas in Colorado. Following Congressional decision, those areas not designated will be open to leasing and development.

LANDS AND REALTY ACTIONS

All Alternatives

Lease development and production requires construction of roads to allow increased access to wells, treatment and storage facilities, and for the construction and maintenance of pipelines, electric power lines, and communication facilities. Electric power lines may be constructed to service wells (pumping equipment), tank batteries, communication, and production facilities. Numerous pipelines would be constructed to transport oil and gas from the wells to gathering stations and treatment facilities. Additional facilities may include storage yards, camp facilities, and airstrips.

Existing facilities may or may not be affected by lease development and production, depending on the location and placement of new oil and gas facilities. Linear-type facilities such as roads, pipelines, and power lines have the greatest potential to be impacted, primarily during construction, maintenance, and reclamation activities of new oil and gas facilities. Some examples of potential impacts are: (1) placement of a well pad may necessitate realignment of short segments of roads or power lines as a result of topography (narrow valleys, ridges); (2) trenching for pipeline construction across a road could interrupt use of the road; (3) construction of a buried pipeline across an existing pipe could expose and possibly rupture the pipe causing a spill; and (4) road maintenance activities could expose and possibly rupture a buried pipeline. These impacts are rare and usually short term because compliance with construction and safety standards generally prevents such impacts, and damage is promptly repaired.

Placement of oil and gas related surface facilities, particularly the linear facilities such as roads, power lines and pipelines, could cumulatively tend to dominate the land use,

especially in areas where these facilities are concentrated. This could tend to dictate location of future facilities as well as limit other authorized uses or users.

TRANSPORTATION

All Alternatives

New oil and gas drilling activity will result in construction of new access roads to the specific locations. When new oil or gas fields are discovered and developed, or existing fields are expanded, roads are usually constructed to each new site as needed.

On occasion, road development for oil and gas development results in improved vehicular access into an area whose resources are fragile and could be critically harmed by improved access by the general public. In these instances, BLM may require the lessee to install a locked gate to restrict access to administrative access (BLM and its licensees and permittees only). This may result in some negative reaction from the public, mainly recreationists, who previously were allowed primitive access into the area.

If a location proves to be a dry hole, the roadway would be closed and rehabilitated unless public benefit would be realized by leaving the road open for either public or administrative use. If roads are retained rather than rehabilitated, increased costs of road maintenance must be borne by the BLM. Even if maintained, these roads may fall to a lower standard. If the roads are not maintained, they may become unusable or contribute to soil displacement, loss of surface vegetation, and increased sediment due to runoff.

If a producing well is found, the road would be upgraded by providing proper drainage and/or resurfacing the road for all-weather use in order to provide year-round well access. This road upgrading would provide drainage through waterbars or culverts, road ditching, and some spot gravel surfacing in soft areas.

BLM's road construction standards are utilized in the designing of access roads to well locations. These standards have proven to be effective in the mitigation of erosion

ENVIRONMENTAL CONSEQUENCES

problems that could arise from improperly constructed roads.

SOCIAL AND ECONOMIC

All Alternatives

Glenwood Springs Resource Area

Projected oil and gas development in the GSRA indicates that, under all alternatives, 90 gas wells would be drilled in the next 20 years. Seventy-two would be drilled in the high potential area of central Garfield County and 18 in the rest of the Resource Area. An assumed success rate of 70 percent would eventually yield total annual production of 2.1 million mcf, equivalent to about 20 percent of the annual average during the 1980s.

The U.S. Forest Service (USFS) economic input-output model (IMPLAN) of Colorado was used to estimate the indirect and induced economic impacts of oil and gas development in the Economic Study Area (ESA). The model uses a 1977 data base. Economic sectors were updated using 1982 employment/output and sales/output ratios. The data used by the economic model are not directly comparable with Bureau of Economic Analysis (BEA) statistics. For consistency, BEA statistics are used. Only employment multipliers are used from the state model.

Whether development occurred at an even rate of about five wells per year or all at once during a short period of time, economic impacts would be negligible. The activity required to drill five wells a year would sustain total employment of only five work years and total income of \$153,000. Both figures are less than 1/10 of one percent of the 1987 numbers for Garfield County alone. Even if all 90 wells were drilled in one year, the resultant 94 work years and \$2.7 million in annual income would amount to less than one percent of the 1987 Garfield County totals.

Most of the local impact would be felt in Mesa County and the greater part of total employment and income effects would be dispersed throughout the Rocky Mountain region, further diminishing the strength of the impacts. Certain businesses--motels, restaurants, local contractors, and service companies--would undoubtedly feel the

benefits of increased local expenditures by drilling companies. However, the effect would not be sustained nor would it be consistent.

The total government revenue generated could eventually be sizeable but still not significant. Sixty-three producing wells (70 percent of the 90 drilled) would yield annually over \$500,000 in federal royalties, about \$175,000 in Colorado severance taxes and another \$175,000 in local property taxes. The county's share of federal royalties, \$135,000, combined with the property taxes of \$175,000, would amount to 2.6 percent of Garfield County's total 1987 revenue.

Kremmling Resource Area

USFS economic input-output model of Colorado was used to estimate the indirect and induced economic impacts of oil and gas development in the ESA. The model uses a 1977 data base. Economic sectors were updated using 1982 employment/output and sales/output ratios. The data used by the economic model are not directly comparable with BEA statistics. For consistency, BEA statistics are used. Only employment multipliers are used from the state model.

The economic analysis is based upon the assumption presented under the RFD section of this document. For the purpose of this analysis, we assumed that price would be "sufficient" to support development and exploration of 108 new wells over the next 20 years. In other words, the analysis assumes two scenarios: (1) 64 new wells will be operating by the year 2010 and an average of five wells are drilled per year, (2) the second scenario assumes 64 new wells by year 2010 and 108 wells are explored that year.

Since a Colorado State model was used and is not specific to the ESA, only an estimate can be made as to how much of the impact will occur in the ESA area. In most cases, the impact will be less than the total projected.

Oil and gas developments, as projected in the "Reasonable Foreseeable Development Assumptions," would not cause significant economic impacts to the region. Significant impacts are defined as changes in population,

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employment, and income greater than 10 percent.

Employment

Scenario (1). The labor force would expand by less than one percent in the ESA. This increase would not be a significant as defined above.

Scenario (2). The labor force would expand by not more than 2.4 percent in the ESA.

Income

No significant impact in either personal or labor income would occur.

Population

Table O-27 (Appendix O) presents population impacts.

Little Snake Resource Area

For the economic analysis, base projections were calculated for Routt and Moffat Counties, using the preceding activities selected from the Basic Activity System of the State of Colorado's Planning and Assessment System (PAS).

Use of the PAS affords a common base of methodology, data, and assumptions and still allows flexibility for local judgment. This system is, therefore, the basis of our methodology. Oil and gas development in northwest Colorado, as projected in the RFD, would not cause significant economic impacts to the region. Significant impacts are defined as changes in population, housing, income, infrastructure, etc., greater than 10 percent.

Development of oil and gas in the LSRA is and will continue to be a function of price. World crude oil price is the driving force behind supply and demand. For the purpose of this analysis, we will assume that price will be "sufficient" to support the development of 550 new wells over the next 20 years. The economic analysis is based upon the assumptions presented under the "Reasonably Foreseeable Development Assumptions" section of this document.

Employment

Expansion of the labor force by less than one percent would occur in both Routt and Moffat counties. The Routt County labor force would increase by 41 persons and Moffat by 143 through the year to 2000. This would not be a significant impact as defined above.

Income

No significant impacts in either personal or labor income would occur. Routt County would have both personal and labor income increases of less than one percent, while Moffat County would see a two percent increase in both personal and labor income.

Housing

Vacancy rates between 9 and 27 percent exist in communities in the region, indicating a housing surplus. Communities could absorb growth from 9 to 27 percent without significant impacts.

Population

An increased population of 76 persons in Routt County and 293 in Moffat County is expected as a result of development. Table O-28 (Appendix O) presents population impacts.

Northeast Planning Area

Impacts

Oil and gas production benefits local economies in several different ways:

a) Increased direct local employment with the company.

b) Increased local income and employment from:

1) Additional purchases from local businesses and contractors by the oil company.

2) Additional purchases from local businesses by company employees.

c) Increased tax base from:

ENVIRONMENTAL CONSEQUENCES

1) Fifty percent of all royalties and public land rentals are redistributed to the county involved, Colorado Water Conservation Board, and Public School Fund.

2) Increased property tax revenues.

The extent of these benefits vary. Initial exploration leads to a temporary income benefit to the community. If a discovery is made, these effects are more lasting. Possible negative impacts on a local community are primarily increased demand on local infrastructures brought about by new employees and business activities. None of the alternatives would have a significant income effect on the area if 238 wells were drilled over 20 years.

None of the alternatives will lead to significant population changes in the NPA. It is estimated that the urban Front Range would have greater than four additional jobs created for every \$1,000,000 of oil and gas produced. This includes the oil and gas employees, company operations, and other employment from expenditures in the area. In contrast, oil and gas activity on the rural Eastern Plains would probably generate less than four jobs per \$1,000,000 locally (although it would be greater if spin-off jobs in urban areas were included). In either case, anticipated effects are expected to be minimal.

There will be no significant differences between the three alternatives in royalty revenue to the federal, state, and local governments, or in the personal income generated. (Approximately 121 producing wells will be drilled on federal minerals in 20 years.)

San Juan/San Miguel Planning Area

USFS economic input-output model of Colorado was used to estimate the indirect and induced economic impacts of oil and gas development in the ESA. The model uses a 1977 data base. Economic sectors were updated using 1982 employment/output and sales/output ratios. The data used by the economic model are not directly comparable with BEA statistics. For consistency, BEA statistics are used. Only employment multipliers are used from the state model.

The economic analysis is based upon the assumptions presented under the RFD section

of this document. For the purpose of this analysis, we assumed that price would be "sufficient" to support development and exploration of 353 new wells over the next 20 years. In other words, the analysis assumes two scenarios for each alternative. (1) At most 150 new wells will be operating by the year 2010 and an average of 18 wells are drilled per year. (2) The second scenario assumes 150 new wells by year 2010 and 353 wells are explored in one year. (However, this magnitude of exploration is unlikely to occur in one year.)

Since a Colorado State model was used and is not specific to the ESA, only an estimate can be made as to how much of the impact will occur in the ESA area. In most cases the impact will be less than the total projected.

Oil and gas developments, as projected in the Reasonable Foreseeable Development Assumptions would not cause significant economic impacts to the region. Significant impacts are defined as changes in population, employment, and income greater than 10 percent.

Employment

Scenario (1) The labor force would expand by less than one percent in the ESA. This increase would not be a significant impact as defined above.

Scenario (2) The labor force would expand by not more than 2.4 percent in the ESA.

Income

No significant impacts in either personal or labor income would occur.

Population

Tables O-29 to O-31 present population impacts for all the alternatives.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Recreation, cultural, riparian, paleontological, sensitive plant, and scenic values, and hazardous areas would be protected on the Areas of Critical

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Environmental Concern (ACECs) discussed in Chapter 3 and listed on Table 4-1.

TABLE 4-1. SPECIAL MANAGEMENT AREAS--LEASE RESTRICTIONS

NAME	DESIGNATION	LEASE RESTRICTIONS	ACRES
GSRA			
Major River Corridors (includes Upper Colo. & Eagle River SRMAs)		NSO	42,148
Rifle Falls & Glenwood Springs Fish Hatcheries		NSO	15,200
Deep Creek	ACEC/SRMA/ Cave Resource/ VRM Class I	NSO	4,400
Bull Gulch	ACEC/SRMA/ VRM Class I	Lease Notice	9,900
Thompson Creek	ACEC/SRMA/ VRM Class I	NSO	4,286
Hack Lake	SRMA	NSO	3,480
Rifle Mountain Park	State Park	NSO	400
Sunlight Peak Area		NSO	1,900
Municipal Watersheds	Critical Watershed	NSO	5,960
Glenwood Springs Debris Flow Hazard Zone	Critical Watershed	NSO	7,160
Garfield Creek State Wildlife Area	Colorado State Wildlife Area	NSO	12,520
Basalt State Wildlife Area	Colorado State Wildlife Area	NSO	4,460
West Rifle Creek State Wildlife Area	Colorado State Wildlife Area	NSO	1,160
KRA			
Ammonite Site	ACEC	NSO	200
Phacelia Site	ACEC	NSO	300
LSRA			
Irish Canyon	ACEC	Avoidance Stipulation	11,680
Lookout Mountain	ACEC	Avoidance Stipulation	6,500
Cross Mountain Canyon	ACEC	NSO	3,000
Limestone Ridge	ACEC/RNA	NSO	1,350
SJ/SMPA			
Anasazi Cultural Multiple Use Area	ACEC	Avoidance Stipulation	
Bull Canyon Rockshelter		NSO	5
Tabeguache Pueblo		NSO	200
Squaw/Papoose, Cross, and Cahone Canyons		NSO	28,464
Painted Hand Ruin		NSO	160
Easter Ruin		NSO	160
Seven Towers Ruin Group		NSO	120
Lighting Tree Tower Group		NSO	200
McLean Basin Towers		NSO	200
Lowry Ruins & Associations		NSO	880
Dominguez-Escalante Ruins		NSO	55
Dolores Cave		NSO	60
Indian Henry's Cabin		NSO	280
Battle Rock		NSO	40

TABLE 4-1. (continued)

Hovenweep Buffer Zone		NSO	600
Painted Hand Petroglyphs		NSO	240
Hovenweep Canyon		NSO	3,400
East Cortez		NSO	6,420
Goodman Canyon and Goodman Point Buffer Zones		NSO	1,560
Cutthroat Castle Buffer Zone		NSO	320
Bass Ruin Complex		NSO	500
Sandstone Canyon		NSO	2,840
Brewer Well Complex		NSO	590
Yellow Jacket Canyon		NSO	5,120
Basin Wickiup Village		NSO	400
Woods Canyon		NSO	980
Bridge Canyon		NSO	1,120
Porter Ruin		NSO	120
Upper Ruin Canyon		NSO	640
Bowdish Canyon		NSO	1,000
Sand and East Rock Canyon	ACEC	NSO	5,880
Cannonball Ruin	ACEC	NSO	80
Bridge Canyon (McElmo)	RNA	NSO	443
Tabeguache Cave II and Canyon		NSO	3,200

Proposed Action Alternative

This alternative would protect areas of special concern from injurious effects of oil and gas development through the use of No Surface Occupancy and/or surface restriction stipulations.

The lease restrictions shown in Table 4-1 are the most restrictive of the mitigative measures prescribed under the Proposed Action Alternative. These restrictions are described in more detail in the RMP/EIS for each special area. The RMP/EIS also describes alternative mitigative measures under changed conditions, such as stipulation waivers or exemptions, or legislative changes (some ACECs may be managed as wilderness upon Congressional designation).

Continuation of Present Management Alternative

This alternative would protect Areas of Critical Environmental Concern through the use of No Surface Occupancy stipulations on oil and gas leasing.

Standard Terms and Conditions Alternative

This alternative would protect the Areas of Critical Environmental Concern through the use of No Leasing.

MINERALS

All Alternatives

Oil and Gas

The RFD projects that as many as 1,789 new wells could be drilled throughout the Study Area. The most favorable conditions for exploration and development of oil and gas would be with as few restrictions as possible.

Oil and gas lessees face numerous environmental obligations in order to comply with applicable laws and regulations. These are incorporated into the lease form (Section 6) and require that oil and gas development must occur in a manner which provides reasonable protection for other energy and mineral resources (coal, fluid minerals, locatable minerals, mineral materials, and non-energy leasable minerals); environmental resources (air, soil, water, vegetation, and visual resources); renewable resources (fish and wildlife habitat, forests

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and woodlands, livestock grazing, and wild horses); and land-use resources (cultural resources, natural areas, recreation, rights-of-way, and wilderness). Discretionary lease stipulations for mitigation of disturbance to environmental resources, energy and mineral resources (other than oil and gas), renewable resources, land-use resources, and support services brings about even greater impacts to oil and gas development. These restrictions can be seasonal restrictions, avoidance stipulations, performance standards, No Surface Occupancy stipulations, or no new leasing.

Application of standard lease terms would not result in any significant irretrievable, or unavoidable impacts to oil and gas. No discretionary lease stipulations have been identified for the protection of other minerals.

The designation of WSAs as wilderness would result in impacts to oil and gas ranging from the loss of some rental income to the irreversible and irretrievable losses of oil and gas resources and the associated royalty income. The magnitude of the loss would depend on the resources available in the particular WSA.

When combining the numerous forms of leasing restrictions or discretionary mitigation with the myriad of resources, it is evident that the Proposed Action and Continuation of Present Management Alternatives would have an adverse impact on oil and gas development. Drilling costs would increase as a result of directional drilling requirements in avoidance or NSO areas. Seasonal restrictions could result in access times being too short for effective exploration and development programs. Performance standards could also increase the cost of exploration and drilling. The cumulative impact of lease restrictions could hinder or prevent oil and gas development in certain locations. In light of this, oil and gas development would be least impacted by allowing lessees to operate under the standard lease terms along with any nondiscretionary mitigation that is currently in effect. This would allow for a more simplified and comprehensive development of oil and gas resources while still promoting the protection of other resources. It should be noted that any discretionary mitigation decided upon in this document would apply only to new leases and not to existing leases.

Any energy and mineral resources or freshwater zones encountered in the wellbore require additional plugs, cement, and casing for adequate protection. With respect to some minerals, such as oil shale, special protective measures are required in known mineral areas. (See description of drilling operations in Appendix A.)

The leasing and production of oil, natural gas, coal-bed methane, and carbon dioxide reserves would result in irreversible and irretrievable losses of the resources that are extracted and the resources that would remain in the ground as unrecoverable. The extent of these impacts would vary greatly depending on particular reservoirs and development methods.

Other Minerals

Required mitigation embodied in section 6 of the standard lease terms and further defined in the Code of Federal Regulations will protect other minerals penetrated by oil and gas wellbores (see description of drilling operations in the Exploratory Drilling section, Appendix A). This mitigation is enforced through review and COAs which monitor and adjust locations, cementing, and plugging programs in order to protect these resources. These actions are taken on APDs, Sundry Notices, and Rights-of-Way approvals.

The potential exists for conflicts between coal and oil and gas leases. Longwall and open pit mining operations are continuous excavations. Well bores drilled into or through mined coal seams ahead of these operations cause reorienting of the mine to avoid conflicts. If mine plans are not altered, there exists the possibility of the mining operation destroying the well and/or the well leaking flammable and toxic gases into the mine endangering the miners. If the mine path is altered, large quantities of coal may be left in place never to be recovered.

Room and pillar mining operations are better equipped to deal with by-passing well bores. However, some additional coal will be left in place since larger than normal protective pillars are left around the well. The presence of wells also limits use of explosives within certain distances of the well. The loss of coal in room and pillar mines as a result of faster oil and gas extraction is felt to be an acceptable resource conservation trade-off.

ENVIRONMENTAL CONSEQUENCES

Stipulations and Conditions of Approval will be employed to mitigate the conflicts between oil and gas operations and coal recovery. This mitigation has been developed in the interest of conservation of resources to ensure the maximum recovery of these important natural resources.

Where an existing oil and gas lease is within the area of an approved surface mine plan, approval of an APD will be deferred until mining is complete. Where oil and gas operations are proposed and then deferred, a suspension of operations and production of the oil and gas lease will be considered. New oil and gas leases will be issued within the area of an approved surface mine plan with a No Surface Occupancy stipulation. The stipulation will contain a waiver provision allowing for the drilling of a well under certain conditions.

For oil and gas leases outside the area of an approved mine plan but within an area identified as having the potential for surface mining, the oil and gas operator will be notified by a Condition of Approval when an APD is approved that the well will have to be plugged under certain conditions. A suspension of operations and production will be considered in such a circumstance. New leases in such areas will not be stipulated; conflicts will be addressed in the same manner as existing leases.

Conflicts between oil and gas leases and underground mines require a different approach. Where an existing oil and gas lease is within the area of an approved underground mine plan, a Condition of Approval will be attached to an APD requiring the plugging of the well under certain conditions. A suspension of the operations and production for the oil and gas lease will be considered. The same Condition of Approval will be applied to APDs filed on existing and new leases in areas outside the area of an approved mine plan but within an area identified as having the potential for underground mining.

New leases within the area of an approved underground mine plan will be issued with a Controlled Surface Use stipulation. The stipulation will require possible relocation of proposed oil and gas operations outside the mine plan area or to accommodate room and pillar mining operations. The stipulation

would contain a waiver provision allowing for the drilling of a well subject to certain conditions.

Potential coal/oil and gas conflict areas include the Sand Wash Basin margin and along the Axial Basin Anticline in the LSRA, the northern San Juan Basin margin in the San Juan Resource Area, the Piceance Basin side of the Grand Hogback in the GSRA, and North Park in the KRA.

CUMULATIVE IMPACTS

This section describes the cumulative impacts that are anticipated to occur. It is greatly expanded from the cumulative impact descriptions provided in the draft EIS. Cumulative impacts are defined in the Council on Environmental Quality (CEQ) regulations 40 CFR 1508.7 as "... the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency ... or person undertakes such other actions."

To determine cumulative impacts, BLM analysts added the impacts of this Proposed Action, i.e., oil and gas development, with the impacts of all other BLM management activities and authorizations on the public lands within the Study Area. In addition, land use trends and significant actions anticipated to occur on other lands within the Study Area are considered. Only impacts of the Proposed Action are described, because the reasonably foreseeable levels of oil and gas development did not vary significantly between alternatives. The resulting impact descriptions are displayed by environmental component for each Resource/Planning Area. This was done in anticipation that if impacts are significant, it will be in the context of the Resource or Planning Area and not the Study Area (the five affected areas combined) or the state as a whole.

The analysis revealed that most environmental components would be impacted similarly, but not significantly within each of the Resource/Planning Areas. The major concern is the amount of surface disturbance resulting from oil and gas activity when added to all other surface disturbing activities, and the impacts this may cause to

CHAPTER FOUR

various resources, most notably wildlife habitat.

The amounts of surface disturbance that are anticipated will have an insignificant impact on forage for livestock, wild horses, and on soil and water resources. Any impacts to these environmental components will be local and short term as described in previous sections of this chapter. Similarly, impacts to forest resources, recreation uses, visual resources, wilderness values, land use authorizations, social and economic conditions and other mineral development is expected to be local and short term.

Except for the urbanizing area along the Front Range within the Northeast Planning Area, air quality is expected to remain good. In this area, the contribution of federal oil and gas leasing and development to air quality degradation is virtually non-existent. In the other Resource/Planning areas pollutants including dust, smoke and other emissions resulting from oil and gas activities will be short term and localized and will not be cumulatively significant.

Most surface disturbance on the public lands is expected to result from vegetation manipulation and other projects designed primarily to improve forage for livestock or habitat for wildlife. Vegetation manipulation and forest management actions change plant succession and occasionally the landscape, however, there are little or no residual impacts when the area has revegetated. In most vegetation types including sagebrush where most of the manipulation is planned, it is considered to take one to five years to

revegetate as shown in the tables that follow for the Resource/Planning areas.

Glenwood Springs Resource Area

Table 4-2 lists the cumulative surface disturbance anticipated to occur over the next twenty years and the residual (unreclaimed) disturbance.

During the next twenty years, oil and gas development is expected to add about 1.6 percent (1,090 acres) to the total area of public lands disturbed from all management actions and causes (68,220 acres). This amounts to just over 13 percent of the Resource Area that are expected to incur some surface disturbance during this period. This level of disturbance is similar to what has been occurring within the area. For this reason, the cumulative impacts to most environmental components have been and will continue to be insignificant.

Private lands are continuing to be developed with growth in the recreation, tourism, mining, and logging industries. For example, 82 percent of the anticipated oil and gas development will occur on private lands. This amounts to approximately 4,970 acres of disturbance over the next 20 years. While all development taken together amounts to only a minor percentage of the total lands with the Resource Area, much of it is occurring on big game winter range. Many winter ranges are now either at or approaching carrying capacity and additional

TABLE 4-2. CUMULATIVE SURFACE IMPACTS--GLENWOOD SPRINGS RESOURCE AREA

Action/Cause	Total Surface Disturbance for next 20 Years (in acres)	Residual Impacts After Mitigation (1-5 years after impacts in acres)
Vegetation Manipulation	27,800	0
Other Livestock Projects--fences, springs, reservoirs, wells, pipelines	280	50
Forest Management	2,000	25
Wildlife Projects	20,040	200
Recreation Facilities	0	0
Rights-of-way, power lines, ditches, roads	750	600
Mining and Other Projects	260	180
Hazardous Material Spills, Wildfire, and other unanticipated events	16,000	0
Oil and Gas Impacts	1,090	79
Totals	68,220	1,134

ENVIRONMENTAL CONSEQUENCES

loss compounds the potential for problems. A continuing and likely increasing impact will be game damage on private lands.

Kremmling Resource Area

Table 4-3 lists the cumulative surface disturbance anticipated to occur during the next twenty years, and the residual (unreclaimed) disturbance.

During the next twenty years, oil and gas activity may result in disturbance to approximately 2,050 acres representing 3.1 percent of the total area disturbed on public lands. Oil and gas activity on private lands is anticipated to impact a similar amount of land. In either case, the amount of land disturbed is insignificant. In total, less than 17 percent of public land is expected to incur surface disturbance during this time period. The largest amounts of surface disturbance involve vegetation manipulation of big sagebrush. To the extent that oil and gas activity also occurs on lands with big sagebrush, critical habitat for mule deer and pronghorn may be disturbed. In addition, sage grouse habitat and populations may be reduced as may habitat and populations of non-game species dependent on the sagebrush ecosystem.

A portion of the 4,090 acres of residual impacts from all surface disturbance would be on private property, however assuming all of this unreclaimed disturbance was on public lands it would amount to about 1 percent,

with oil and gas activity contributing about 30 percent of the total. The impacts of this surface disturbance spread over all the public lands in the Resource Area are not considered significant.

Little Snake Resource Area

Table 4-4 lists the cumulative surface disturbance anticipated to occur during the next twenty years, and the residual (unreclaimed) disturbance.

During the next twenty years, oil and gas activities when added to all other management actions may result in surface disturbance to 87,425 acres which is just under seven percent of the public lands within the Resource Area. The portion attributable to oil and gas will be about 12,350 acres, or about 14 percent of the total. On private lands, the amount of disturbance is expected to be similar, because about one half of the projected development will be on private land.

Oil and gas development is expected to cause more than half of the unreclaimed surface disturbance (land occupied by more or less permanent facilities such as roads, pump jacks, storage tanks etc. are considered unreclaimed). The total area of residual impact from all causes and actions is about two tenths of one percent and is therefore not considered significant.

TABLE 4-3. CUMULATIVE SURFACE IMPACTS--KREMMLING RESOURCE AREA

Action/Cause	Total Surface Disturbance for next 20 Years (in acres)	Residual Impacts After Mitigation (1-5 years after impacts in acres)
Vegetation Manipulation	45,200	0
Other Livestock Projects--fences, springs, reservoirs, wells, pipelines	150	30
Forest Management	4,000	50
Wildlife Projects	10,000	200
Recreation Facilities	50	50
Rights-of-way, power lines, ditches, roads	2,200	1,100
Muddy Creek Reservoir (includes private property, where majority of impacts occur)	1,450	1,450
Hazardous Material Spills and other unanticipated events	100	10
Oil and Gas Impacts	2,044	1,200
Totals	66,894	4,090

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TABLE 4-4. CUMULATIVE SURFACE IMPACTS--LITTLE SNAKE RESOURCE AREA

Action/Cause	Total Surface Disturbance for next 20 Years (in acres)	Residual Impacts After Mitigation (1-5 years after impacts in acres)
Vegetation Manipulation	50,000	0
Other Livestock Projects--fences, springs, reservoirs, wells, pipelines	1,475	300
Forest Management	500	0
Wildlife Projects	20,000	200
Recreation Facilities	100	100
Rights-of-way, power lines, ditches, roads	2,000	500
Coal Mining	1,000	500
Hazardous Material Spills and other unanticipated events	0	0
Oil and Gas Impacts	12,350	3,200
Totals	87,425	5,600

Northeast Planning Area

In this Planning Area, BLM has surface management of only about 32,000 acres consisting largely of small scattered parcels. BLM management actions and authorizations are insignificant in terms of cumulative impacts within the 21 million-acre Planning Area. For this reason, a table comparable to those displayed for the other Resource/Planning Areas was not developed.

Over a twenty year period, oil and gas exploration and production on federal leases is expected to disturb 848 acres. Most, if not all, will occur on 443,000 acres of split estate land where the surface is in non-federal ownership. Historically, only .68 percent of the wells drilled have been on the federal mineral estate, exclusive of the Pawnee National Grasslands. In total therefore, about 84,200 acres may be disturbed by oil and gas activities during the next twenty years. This is insignificant in relation to the almost 21 million acres within the Planning Area, however, most of this surface disturbance will be concentrated where fields are developed.

Within the Northeast Planning Area, other surface disturbing activities are taking place at a rapid rate. Urban areas are expanding at approximately two acres per hour and the new international airport being constructed northeast of Denver will further accelerate this trend. In this expanding urban fringe, particularly in Weld and Adams counties, oil and gas caused surface disturbance, although

a minor part of the total, will further exacerbate the trend of converting privately owned farm and ranch land to other uses.

San Juan/San Miguel Planning Area

Table 4-5 lists the cumulative surface disturbance anticipated to occur during the next twenty years, and the residual (unreclaimed) disturbance.

During the next twenty years oil and gas exploration and production activity is expected to add approximately 2 percent (1,430 acres) to the total public lands that will incur disturbance (84,660 acres). This amounts to about 8.5 percent of the public lands within the Planning Area. Considering the total area, this small amount of disturbance is not considered significant, however the potential cumulative impact on cultural resources is a concern.

Inventories conducted in preparation for oil and gas work is expected to result in the recordation of approximately 18,000 cultural sites that are eligible or potentially eligible to the National Register of Historic Places. The use of the No Surface Occupancy stipulation for cultural resource protection reduces the number of impacted eligible or potentially eligible sites from about 18,000 sites to 2,000 sites, by eliminating new access routes into areas with high cultural site densities. Eighteen thousand sites represent almost 22 percent of the total number of eligible or potentially eligible sites likely to be identified

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TABLE 4-5. CUMULATIVE SURFACE IMPACTS--SAN JUAN/SAN MIGUEL PLANNING AREA

Action/Cause	Total Surface Disturbance for next 20 Years (in acres)	Residual Impacts After Mitigation (1-5 years after impacts in acres)
Vegetation Manipulation	57,800	100
Other Livestock Projects--fences, springs, reservoirs, wells, pipelines	475	75
Forest Management	1,800	30
Wildlife Projects	20,000	400
Recreation Facilities	100	100
Rights-of-way, power lines, ditches, roads	3,000	1,500
Hazardous Material Spills and other unanticipated events	55	5
Oil and Gas Impacts	1,430	410
Totals	84,660	2,620

during inventories of the public lands during this time period.

Although the potential is low, these sites are at risk should they not be identified in advance of the surface-disturbing activity. Also, significant impacts can occur to cultural sites over time due to increases in access to sites brought about by additional roads and trails. This is particularly true for oil and gas operations as these developments are expected to occur in the highest cultural site density areas. The Final San Juan/San Miguel Resource Management Plan and Environmental Impact Statement discusses these potential impacts in more detail on pages 63-66.

The residual (unreclaimed) surface disturbance of 2,620 acres represents just over one-quarter of one percent of the total public land acreage in the Planning Area. Oil and gas activity will contribute approximately 16 percent to the total residual impact.

100

CHAPTER FIVE

**CONSULTATION AND
COORDINATION**

CHAPTER FIVE

CONSULTATION AND COORDINATION

REVIEW OF THE DRAFT EIS

The Draft EIS was filed with the Environmental Protection Agency on May 4, 1990. The notice of availability was published in the May 10, 1990, issue of the *Federal Register*. The notice was made available to the news media in the State of Colorado. Copies of the DEIS were mailed to federal, state, and local government agencies and to interested organizations and individuals. Copies of the DEIS were available upon request and public review copies were available throughout Colorado. The public comment period of 90 days ended on August 17, 1990.

Public hearings were held in Grand Junction, Denver, and Durango on July 2, 9, and 16, 1990, respectively.

RESPONSE TO COMMENTS

All letters and testimony were reviewed and considered in preparation of the FEIS. Comments which addressed the adequacy of the DEIS received a response. Each commentor was assigned an index number. Commentors are listed on Table 5-1. Commentors 1 through 100 and 129 and 130 submitted comments in writing; Commentors 105 through 128 testified at the hearings.

Comment letters are identified in Table 5-2. The letters are displayed in Appendix Q.

Comments were paraphrased and combined to reduce the bulk. Comments were also grouped by Chapter and Appendix. The commentor index number is shown following the comment. The response for each comment identifies that the text of the EIS was changed or provides the rationale for why the comment did not require a text change. Comments are shown by

environmental component in the same order they appear in the Table of Contents.

Comment letter number one is an announcement that was sent out by the Colorado Environmental Coalition to its members. The BLM received 76 letters that contained the five comments shown in the announcement. Instead of reproducing all 76 letters, the BLM chose to publish just the announcement and identify all 76 commentors.

Table 5-1. List of Commentors on Colorado Oil and Gas Leasing Draft EIS

NAME	COMMENT NUMBER
1. Jacqueline Mintener	20,21,22,37,38
2. Jean Shapiro	20,21,22,37,38
3. Doug (? - illegible)	20,21,22,37,38
4. Stephen Repile	20,21,22,37,38
5. Kathryn Allen	20,21,22,37,38
6. John Bermingham	20,21,22,37,38
7. Malcolm Rea	20,21,22,37,38
8. Theo Waller	20,21,22,37,38
9. Stephen & Laurel Higgins	20,21,22,37,38
10. John Reed	20,21,22,37,38
11. Henry Hite	20,21,22,37,38
12. Lorraine Lane	20,21,22,37,38
13. Linda Melos	20,21,22,37,38
14. Elizabeth Otto	20,21,22,37,38
15. Gwen Hoffnagle	20,21,22,37,38
16. Bruce Berger	20,21,22,37,38
17. Jeffrey Trull	20,21,22,37,38
18. Jennifer Kitchel	20,21,22,37,38
19. Iva Peacock	20,21,22,37,38
20. Richard Eversole	20,21,22,37,38
21. William Folger	20,21,22,37,38
22. Jan Seaman	20,21,22,37,38
23. Karin White	20,21,22,37,38
24. Evelyn Keith	20,21,22,37,38
25. Marjorie Darling	20,21,22,37,38
26. Frank & Ruth Harold	20,21,22,37,38
27. David Bryant	20,21,22,37,38
28. Maureen Keilty	20,21,22,37,38
29. Cora Smyth	20,21,22,37,38
30. Charles Swan	20,21,22,37,38
31. Roz McClellan	20,21,22,37,38
32. Barbara Brayton	20,21,22,37,38
33. Cindy Lagace	20,21,22,37,38
34. Daphne Peirce	20,21,22,37,38
35. Jason Smolka	20,21,22,37,38
36. Babs Schmerler	20,21,22,37,38
37. Alice White	20,21,22,37,38
38. Felice Rhiannon	20,21,22,37,38
39. Larry Spiegel	20,21,22,37,38
40. Glenn Barney	20,21,22,37,38
41. Paul & Virginia Lappala	20,21,22,37,38
42. Lorraine Lane	20,21,22,37,38
43. Joanne Boudreaux	20,21,22,37,38
44. Michelle Holcome	20,21,22,37,38
45. S. Smith	20,21,22,37,38
46. Dave Lomas	20,21,22,37,38
47. Lyle Tautfest	20,21,22,37,38

TABLE 5-1 (continued)

48. Maggie Smith	20,21,22,37,38
49. Nina Johnson	20,21,22,37,38
50. John Ritchey	20,21,22,37,38
51. Kirk Vogel	20,21,22,37,38
52. David Mork	20,21,22,37,38
53. Lynn & Larry Threlfall	20,21,22,37,38
54. Steve Goochman	20,21,22,37,38
55. Donald Thompson	20,21,22,37,38
56. Mike Cockrell	20,21,22,37,38
57. Robert White	20,21,22,37,38
58. Bettie Burton	20,21,22,37,38
59. Mary Harris	20,21,22,37,38
60. Charla Palmer	20,21,22,37,38
61. Michael Adams	20,21,22,37,38
62. Judith Dome	20,21,22,37,38
63. Kenneth Wam	20,21,22,37,38
64. Sue Plenciak	20,21,22,37,38
65. Michael Kelly	20,21,22,37,38
66. Robert Winslow/Marilyn Leftwick	20,21,22,37,38
67. Kenneth Wam	20,21,22,37,38
68. Michael Yadowsky	20,21,22,37,38
69. Mary Smelker	20,21,22,37,38
70. Beverly and Tony Baker	20,21,22,37,38
71. Wilderness Society	20,21,22,37,38
72. Dave and Lauren Naslund	6,20,21,22,37,38,
73. Wilbur Boldt	38
74. Dorothy Gumaer	20,22
75. John Dominique	20,22
76. Mark Pearson	7,15,23-27,51,145
77. Sicra Club	26,204,205,214
78. National Wildlife Federation	26,44,64,89,157,228
79. Mobil Exploration	50,156,186,187,213
80. Dean Visitainer	233,234
81. Colorado Env. Coalition	3,26,27,43,73,155,228,234
82. Trapper Mining	143,224-226
83. Kirk Koepsel	4,26,27,39-41,75-79,90,267
84. Int. Assoc. of Geo. Contr.	238,241,243-245,255-257
85. CGG Proprietary Data	238,241,243-245,255-257
86. ROMOGA	5,27,42,45,46,48,49,50,57,58,61,144,154,162,163, 185,186,188,232,246,247,251-254,257,268,277,283
87. Wildlife Society	65,174
88. Env. Prot. Agency	46,52,115-118,153,181,198,211,212
89. Poulson, et al	61
90. US Forest Service	59,62,63,66,67,68,72,82-84,87,92-97,101,105,106, 131,152,164,165,167-173,177,179,182-184,189-191, 194,195,223,227,229-231,235,240,242,275,281,282

TABLE 5-1 (continued)

91. Nat. Park Service	2,30,31,36,86,98,107-109,113,114,119,120,121,123,125,126,128,130,132,159,180,199,200,201,210,218-222,228,266,278,287
92. Colo. Dept. of Nat. Res.	10,11,29,32,33,35,60,81,85,88,91,99,100,102,103,113,122,124,129,149,151,160,161,175,176,196,202,236,237,263-265,272,274,276,279,280,284
93. Texaco	1,27,46,47,50,61,146,148,160
94. Amoco	258-262,269,277
95. Chevron	14,17,18,27,28,50,57,69,147, 185,250
96. US Fish & Wildlife	16,34,104,110-112,142,178, 192,193,248,271,286
97. Sierra Club	13,70,197,209
98. Raftopoulos Ranches	71,74
99. US Forest Service	12,27,46,50,80,127,203,208, 239,249,270
100. U.S. Bureau of Mines	None
101. Dale Doose	None
102. U.S. Dept. of the Air Force	None
103. Corps of Engineers	None
104. Kathy Zarlingo	21,22
105. Neil Bradford	22
106. Danni Langdon	21,56
107. Bill Prather	35
108. Mark Pearson	7,15,23-27,51,145
109. Don Thompson	20-22
110. Kirk Cunningham	20,21,26
111. Rocky Smith	20
112. Marty Walter	21,26
113. Lee Baker	24
114. Roger Flynn	21,26,24
115. Roz McClellan	26
116. Paul Zogg	20,26
117. Todd Robertson	21,22
118. Jan Hardin	20,21
119. Casye Mulligan	22
120. Wilbur Boldt	None
121. Alissa Salmore	21
122. Julius Dahne	21,53
123. L.G. Truby	8,54,134-137,207,216,217
124. Carl Weston	9,133,138-141,206,215
125. Mark Rinnert	6,55
126. Patty Schuler	158
127. Jan Neleigh	None
128. Chuck Jones	19
129. Rebecca Dunn	20-22,37,38
130. Cyprus Empire	224,225

Table 5-2. Comment Documents

AUTHOR	CONTROL #	COMMENT #
Colo. Env. Coal.	1	20,21,22,37,38
Sierra Club	2	7,15,23-27,51,145
G.J. Hearings	3	21,24,27,56,145,234
Denver Hearings	4	24,26,53
Durango Hearings	5	6,8,9,19,54,55,133-141,158,206,207,215-217
Sierra Club	6	26,204,205,214
Nat. Wldlf. Fed.	7	26,44,64,89,157,228
Mobil Expl.	8	50,156,186,187,213
Dean Visintainer	9	233,234
Colo. Env. Coal.	10	3,26,27,43,73,155,228,234
Trapper Mining	11	143,224-226
Kirk Koepsel	12	4,26,27,39-41,75-79,90,267
CGG Prop. Data	13	238,241,243-245,255-257
ROMOGA	14	5,27,42,45,46,48-50,57,58,61,144,154,162,163,185,186,188,232,246,247, 251-254,257,268,277,283
Wildlife Soc.	15	65,174
Env. Prot. Agency	16	46,52,115-118,153,181,198,211,212
Poulson,et al	17	61
US Forest Service	18	59,62,63,66-68,72,82-84,87,92-97,101,105,106,131,152,164,165,167-173, 177,179,182-184,189-191,194,195,223,227,229-231,235,240,242,275,281,282
Nat. Park Service	19	2,30,31,36,86,98,107,108,109,113,114,119,120,121,123,125,126,128,130,132,159,180,199-201,210,218-222,228,266,278,287
Dept. of Natural Res.	20	10,11,29,32,33,35,60,81,85,88,91,99,100,102,103,113,122,124,129,149-151,160,161,175,176,196,202,236,237, 263-265,272-274,276,279,280,284
Texaco	21	1,27,46,47,50,61,146,148
Amoco	22	258-262,269,277
Chevron	23	14,17,18,27,28,50,57,69,47,250,285
USFWS	24	16,34,104,110-112,147,178,192,193,248,271,286
Sierra Club	25	13,70,197,209
Raftopoulos Ranches	26	71,74
USFS	27	12,27,46,50,80,127,203,208,239,249,270
Cyprus Empire	28	224,225

COMMENTS AND RESPONSES

Chapter 1 Comments

1. Comment: Although we commend your efforts to combine several plan amendments into one document, this should have been done in a more logical and coordinated fashion. The document includes a number of discrepancies and is very confusing. (93)

 Response: See revised text.
2. Comment: Page 1-2. We recommend that the last two sentences be deleted since the issue of protective leasing in the case of drainage is not resolved, and too much detail would be needed to adequately explain the complexities of the issue. (91)

 Response: See revised text.
3. Comment: CEC strongly disagrees with the statement on page 1-2 of the DEIS which says, "In order to protect the United States from loss of revenues resulting from the drainage of oil and gas under lands closed to leasing, the Secretary of the Interior has authority to issue protective leases within areas otherwise unavailable for leasing." (81)

 Response: The scope of the plan amendment/EIS does not extend to lands excepted from leasing under the Mineral Leasing Act. Therefore, this statement has been removed in the final. The Regional Solicitor of the Department of the Interior has provided us with an opinion outlining the Secretary's authority to issue protective leases for such lands. However, if this authority is required, NEPA compliance will be achieved on a site-specific basis for the affected lands.
4. Comment: The Colorado State Office of BLM has a chronic problem of not placing proper stipulations on leases. (83)

 Response: The Colorado State Office record is quite good in respect to properly applying stipulations. The comment is not supported by the facts in the record.
5. Comment: RMOGA never received notification of the BLM's public meetings on the subject DEIS. Since we were not informed of the meetings, we could not have representatives attend. We are sure that the BLM's failure to notify RMOGA was an oversight. We would hope, however, that the BLM is not relying solely upon press releases to provide public notification of meetings. Mailing lists should be compiled and used to inform interested parties of future activities. (86)

 Response: RMOGA received a notice in the mail two weeks prior to the meetings and twelve notices were delivered to your office by a team member.

CONSULTATION AND COORDINATION

6. Comment: How is the BLM going to insure that the EIS is followed and that it works. (72,125)
- Response: These plan decisions are subject to continuous monitoring to ensure that adequate resource protection is provided. Such monitoring would trigger a new analysis to determine if another plan amendment is necessary. Also see response to comment #7.
7. Comment: BLM needs a system that will assure that the decisions in the EIS are implemented. (76, 108)
- Response: We agree, and have been working for the past two years to improve our system. BLM Colorado's record is better in this regard than it may appear considering the hundreds of parcels being offered for lease and the dozens of different protective stipulations that may be applied. In the past three years, less than one percent of posted sale parcels have had to be revised.
8. Comment: What is the legal reference for the BLM allowing the state of Colorado to set the spacing on wells. (123)
- Response: By Memorandum of Understanding, the BLM utilizes the expertise of the Colorado Oil and Gas Conservation Commission (COGCC) to conduct spacing hearings and determine recommended spacing. This arrangement has worked well because of its efficiency and convenience for the state and federal government and oil and gas operators. However, both the BLM and the COGCC recognize that the BLM has the legal authority for establishing spacing on federal and Indian lands.
9. Comment: The EIS should evaluate the ability of the Colorado Oil and Gas Commission to carry out its responsibilities. (124)
- Response: It is not the responsibility of the BLM to evaluate the ability of the COGCC to carry out its legally mandated responsibilities. This EIS analyzes the impacts of BLM decisions; it is not appropriate or reasonable to analyze the actions or capabilities of other agencies.
10. Comment: The treatment of leasing within the state parks, recreation areas, natural areas, and research natural areas is somewhat ambiguous, but seems generally governed by No Surface Occupancy stipulations. In addition to imposing such a limitation, BLM should coordinate leasing and development activities with the Division of Parks and Outdoor Recreation. (92)
- Response: Concur--this has been accomplished on a local basis.
11. Comment: It would be desirable if the MOU between BLM and the COGCC included wildlife mitigation and other protective environmental agreements as well as mining agreements. (92)
- Response: BLM has agreements with other state agencies charged with the responsibility for wildlife and environmental protection.

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12. Comment: A diagram and short discussion of how the decisions being made in this document relate to the overall process might be useful. The same type of discussion is applicable to how the EIS process works. What happens next when this document is approved might answer some questions. The Proposed Action, purpose and need, and decisions to be made are somewhat obscure and require careful reading. (99)
- Response: See revised text.
13. Comment: The high amount of acreage open to leasing for oil and gas development shows an unbalanced management plan. Favoring the demands of oil and gas companies over other land users is apparent. (97)
- Response: See revised Standard Terms and Conditions Alternative.
14. Comment: We have some serious concerns about your draft EIS. First, the acreage figures throughout the document need to be reexamined, since many discrepancies between the acreage figures are present. (95)
- Response: See revised text.
15. Comment: Are the public participation requirements those required by BLM's planning and NEPA regulations? (108)
- Response: The public participation in the review of a waiver, exception, or modification is contained in BLM's general onshore oil and gas leasing regulations (43 CFR 3101).
16. Comment: Our June 16, 1989, memorandum discussed the importance of the Section 7 consultation process. However, we do not find any attention to the Section 7 process anywhere in the EIS. This should be corrected. (96)
- Response: See Chapter 1, Relationship to Non-BLM Policies, Plans, and Programs.
17. Comment: For all of the proposed changes to the RMPs, you need to justify why such changes are necessary or desirable. (95)
- Response: See revised text.
18. Comment: We believe the document would be easier to understand if, for the Proposed Action, you would summarize in one place all of the major changes that are proposed in the five RMPs. (95)
- Response: See revised text.
19. Comment: What leases will the Proposed Action affect? (128)
- Response: The Proposed Action will only affect those leases that are issued after the Record of Decision is signed. This is currently scheduled to occur in March 1991.

Chapter 2 Comments

20. Comment: The following areas should be given No Lease status:
a. Areas of Critical Environmental Concern (ACECs)
b. All wetland, riparian, and aquatic areas
c. Critical winter range, calving/fawning areas, and migration corridors
d. Habitat for endangered species
e. Cultural sites
f. Developed and primitive recreation areas. (1 thru 72, 74, 75, 109, 110, 111, 116, 118, 129)
- Response: All of the mentioned areas were individually studied to determine the proper protection. No leasing is not the most compatible answer in all cases. Leases with No Surface Occupancy or Timing Limitations can, in most cases, adequately protect the resources. See also response to comment #21 and #23.
21. Comment: These areas should be given No Lease status:
a. Vermillion Basin, including the Irish Canyon ACEC and Lookout Mountain ACEC.
b. Sunlight Peak in the GSRA
c. Anasazi ACEC in the SJ/SMRA (1 thru 72, 104, 106, 109, 110, 112, 114, 117, 118, 121, 122, 129)
- Response: a. These areas were addressed in the Little Snake Resource Management Plan. BLM has determined that avoidance stipulations on Irish Canyon and Lookout Mountain will adequately protect the resource. Please review the Little Snake RMP for a complete analysis of the rationale for protection of Irish Canyon and Lookout Mountain ACECs. (Draft RMP pages 2-61 and 2-62, and Appendix 22).
- b. No Lease status is not needed to protect semi-primitive-nonmotorized recreation and visual values in the Sunlight Peak area. The No Surface Occupancy stipulation under the Proposed Action would prevent impacts which could impair these values. Road construction would be precluded
- c. The Multiple Use ACEC in SJRA is not just for cultural resources (Anasazi) management. It was designated for its mineral, recreation, range, and wildlife values also. The ACEC designation was meant to be a lever for more intensive management and greater funding--not to deny or restrict mineral development, but to channel it away from sensitive areas and manage it more intensively. In addition, the No Lease alternative is not an option for this area as most leases in the area are held by production for longer than the term of the RMP/EIS. Also, much of the ACEC is covered by the McElmo Dome Unit. The existing leases would not expire during the period of time covered by the RMP/EIS, and therefore, would not be subject to a "Lease" or "No Lease" decision.

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22. Comment: The No Surface Occupancy (NSO) stipulation is not effective. The BLM routinely grants waivers to this stipulation, thus rendering it ineffective. (1 thru 72, 74, 75, 77, 104, 105, 108, 109, 117, 119, 129)
- Response: The BLM grants waivers to the NSO stipulation only when it can be shown that no significant impacts will occur. An environmental analysis is conducted and the management objectives for the specific area are checked to make sure they will still be met if the waiver is granted. We are not aware of any waivers ever being granted in the state of Colorado.
23. Comment: All ACECs, RNAs, and SRMAs should be placed under No Leasing. There is not justification for not doing so. No impacts to the industry have been identified that would prevent this. (76, 108)
- Response: These areas can be adequately protected with NSO. The BLM requirements are that the least restrictive stipulations be applied that will still adequately protect the resources. The No Leasing stipulation does not offer any more protection to surface resources than the No Surface Occupancy. The different resources may require different types of protection, i.e., visual resources are protected differently than big game resources. Therefore, one answer is not correct for all.
24. Comment: The BLM should identify more areas of No Leasing. With the BLM's ability to waive stipulations, the only way we can be assured of resource protection is with No Leasing. (76, 108, 114)
- Response: The Standard Terms and Conditions Alternative does contain more No Leasing acreage than described in the DEIS. The BLM must ensure that the management objectives are met and that there will not be any significant impacts prior to waiving a stipulation. An environmental analysis is also required and an opportunity provided for public review.
25. Comment: The BLM should place all of the identified cultural sites in the SJ/SMPA in a No Leasing category instead of NSO. The NSO stipulation is too easy for the BLM's Authorized Officer to waive. (76, 108)
- Response: NSO designations are for the purpose of protecting resources and are not waived if there is still a resource to be protected. The NSO designations in Appendix E are the appropriate action and does not justify "No Leasing" of those areas. We have reviewed the section and have determined that there should be no exception criterion for Items 2 through 36. Revised text in Appendix E.
26. Comment: The EIS does not have an adequate range of alternatives. There should be one alternative that has a larger No Leasing category. (76, 77, 78, 81, 83, 110, 112, 114, 115, 116)
- Response: See revised text.
27. Comment: The BLM should include more detailed maps in the EIS. (76, 81, 83, 86, 93, 95, 99)
- Response: More detailed maps would cause numerous problems. The resources and the constraints used to protect them are viable and subject to constant changes. If the BLM distributed detailed maps, they could be out of date as quickly as they could be printed. Detailed maps are available in each BLM office and copies can be obtained by contacting the appropriate office.

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28. Comment: We believe the discussion of mitigation measures that will be used under all the alternatives, on page 2-3, uses an inflammatory and unrealistic example by discussing the terrible effects of oil and gas activities on elk if the BLM did not manage the situation. Since the BLM does control and monitor our activities, this discussion is unrealistic, serves no purpose, and should be deleted. (95)
- Response: The statement explained that this was an example. It was not an attempt to portray the ordinary situation.
29. Comment: The Timing Limitation stipulation does not always apply to maintenance activities, especially in emergency situations. Damage to wildlife habitat under these circumstances should be addressed and stipulations proposed for mitigating losses. (92)
- Response: The impacts to wildlife from oil and gas maintenance and emergency activities are so minor that they may be handled without a special lease stipulation. These impacts were analyzed when the Timing Limitation stipulations were developed and no stipulation is necessary to deal with them.
30. Comment: The text explaining Table 2-3 should clearly state that federal lands not available for leasing, such as lands within NPS units, are not included in the table. (91)
- Response: See Chapter 1, Relationship to Non-BLM Policies, Plans, and Programs. These were clearly identified.
31. Comment: We note from Tables 2-3 and 2-4 that the Proposed Action would result in fewer restrictions on fewer acres in the Little Snake Resource Area (LSRA) than would the "No Action" alternative. We were not able to determine on which lands exploration and development would be less constrained. (91)
- Response: The level of resource protection under current management versus the Proposed Action will not change for exploration and development. The major change from the acreages in Table 2-3 and 2-4 was from new data added for wildlife mitigation throughout the Resource Area which ultimately reduced the number of acres requiring restrictions. It would be impossible to project where the exploration and development would take place within the LSRA. The analysis in Appendix B is the best estimate we could make of potential development.
32. Comment: More discussion of Tables 2-3, 2-4, and 2-5 would help differentiate between the three alternatives. (92)
- Response: See revised text.
33. Comment: The comparison of alternatives should discuss other wildlife besides raptors. (92)
- Response: See revised text.
34. Comment: Based on this table only, there appears to be only minor differences between the three plans. It is not clear what advantage the proposed amendment has to resource protection or the administration of oil and gas leasing. (96)
- Response: See revised text.

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35. Comment: The impact of the second alternative, Continuation of Present Management, on wildlife will be different from the proposed alternative and the table should reflect this. In addition, why would wild horses experience "losses" when wildlife are only "disturbed"? (92)
- Response: See revised text.
36. Comment: Table 2-6 indicates that all the alternatives evaluated are clustered in the middle of the spectrum. We would like to see additional stipulations that provide for increased protection in the areas of visual and air quality. (91)
- Response: Mitigation is designed to protect visual resources and air quality in accordance with predicted impacts and existing laws and regulations.
37. Comment: The best way to protect critical resources is to close the lands to leasing and not issue leases with stipulations. (1 through 72, 129)
- Response: This is not always true. An example would be the case of a nesting raptor can be protected with a timing stipulation. The raptor would not be present the remainder of the year so the physical presence of a drill rig would not cause any harm. Total exclusion of surface activity is not the answer in all cases.
38. Comment: BLM is failing to protect desert canyons, important river corridors, critical wildlife habitat, and endangered plant species. (1 through 73, 129)
- Response: River corridors are protected with stipulations designed for the riparian vegetation, wetlands, and water quality. Critical wildlife habitat is protected by Controlled Surface Use, Timing Limitation, and No Surface Occupancy stipulations. Endangered plant species are always protected by whatever restriction is required. Desert canyons are not protected per se. If an important or sensitive resource is located in the canyon, it will be protected.
39. Comment: I recommend that a NSO stipulation, at a minimum, be placed on all lands with slopes over 40 percent and on all fragile soil areas. (83)
- Response: We believe that the Controlled Surface Use stipulations (Appendix E) adequately mitigate impacts on steep slopes and fragile soils.
40. Comment: The plan has Controlled Surface Use stipulations for fragile soil areas in TWO of the five resource areas. Why do the other three resource areas not have this protection? (83)
- Response: They have analyzed the situation and decided to apply the appropriate COAs to the APD and accomplish the necessary mitigation, i.e., prevent erosion/disturbance on fragile soils. The fragile soil stipulation has been adopted by the NPA also.
41. Comment: Controlled Surface Use strips are very weak. NSO or No Lease would provide proper protection for ACECs. (83)
- Response: Controlled Surface Use is effective mitigation for certain ACECs. Most ACECs are mitigated with a No Surface Occupancy stipulation.
42. Comment: DEIS focuses only upon the opportunity to heavily restrict oil and gas activities without adequate justification. (86)
- Response: The document is supposed to analyze the impacts of the Proposed Action and develop mitigation for those impacts.

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43. Comment: CEC insists that the BLM consider the No Lease option on a parcel by parcel basis on all of its lands covered by this DEIS. (81)
- Response: A parcel by parcel analysis would be impossible. The huge amount of repetitions is not feasible and we must look at entire ecosystems not just 40 acres.
44. Comment: This DEIS fails to adequately consider the No Leasing alternative, in violation of the National Environmental Policy Act (NEPA) and Bob Marshall Alliance v. Hodel, 852F.2d 1223 (9th Cir. 1988). (78)
- Response: See revised text.
45. Comment: By arbitrarily increasing the projected level of development far beyond what would be considered reasonable, the level of impacts are also arbitrarily increased. Consequently, lease and operating restrictions would also be increased in an effort to provide "adequate" protection to surface resources in accordance with the impact analysis. (86)
- Response: See revised text.
46. Comment: The number of wells drilled must not be the deciding factor whether further NEPA analysis is required. If the level of impacts analyzed in the document has not been reached, even if twice as many wells have been drilled than predicted, the NEPA document should still be valid. (86, 88, 93, 99)
- Response: See revised text.
47. Comment: In the Little Snake Resource Area, the BLM predicts that 550 wells will be drilled over the next 20 years based on historical data. Yet the BLM almost doubled its projections to 1,000 wells, creating a "worst case scenario". (93)
- Response: See revised text.
48. Comment: There should be no need to double the number of projected wells to ensure a long life for the NEPA documentation. (86)
- Response: The Resource Areas did increase the number of wells in most cases due to the recent increased interest and activity in both natural gas and coal bed methane that was not reflected in the historical projections.
49. Comment: The BLM is required by regulation and policy to justify the use of more restrictive stipulations over less restrictive stipulations. The BLM indicates on page 2-4 it has complied with this direction. However, the evidence presented in the DEIS does not indicate that this is true. In fact, the analysis indicates there is no need even for the restrictive stipulations that are currently in use throughout the five resource areas. (86)
- Response: See revised text.
50. Comment: We object to the use of "worst case development" scenarios when referring to future oil and gas development. The BLM should use "reasonably foreseeable development." (79, 86, 93, 95, 99)
- Response: The appropriate sections have been revised.

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51. Comment: BLM should require a 30-day public review period when exceptions to leasing stipulations are granted. (76, 108)
- Response: This is the requirement for some modifications of stipulations. Waivers of stipulations require plan amendments, which incorporate public reviews. Stipulation exceptions require plan conformance and an environmental review. Public review is not routinely warranted nor required.
52. Comment: Casing design and drilling methods have been adopted to avoid certain environmental and geological problems. A brief statement describing the problem and the solution would be helpful, rather than citing "industry standard procedures or techniques." These statements convey little to the reader unfamiliar with this industry. (88)
- Response: See revised text (Appendix A).
53. Comment: There should be a discussion of horizontal drilling and its impacts. (122)
- Response: See revised text.
54. Comment: BLM should consider the New Mexico method of well casing up to the surface and water monitoring wells. (123)
- Response: This proposal is thought to be unacceptable by the BLM because of difficulties in placing the cement top exactly in the desired position and the allowance of drilling fluid contaminated cement to remain in the hole rather than circulating it out as is generally the case when the annular space is completely filled. In addition, the open (uncemented) zone(s) would be able to communicate (or crossflow) which may be detrimental. Finally, casing corrosion is greatly reduced by the cement sheath around it, and if a 200-foot zone was left uncemented, corrosion would become a significant factor.
55. Comment: BLM should consider buying back the oil and gas leases. (125)
- Response: This action requires a specific act of Congress and a special appropriation of funds to pay for the lease. In the past, Congress has not been receptive to these proposals.
56. Comment: What procedures will be used to control noxious/poisonous weeds? (106)
- Response: Conditions of Approval, such as that shown on page D-14 of the DEIS, are written into approvals in areas with weed problems. The operator is required to control weeds. The method is often mechanical, however, if chemicals are to be used, prior approval by the Authorized Officer must be obtained.
57. Comment: Another quandary regarding the GSRA is the staggering increase in restrictive stipulations proposed in the Preferred Alternative. How can the BLM possibly justify an increase of No Surface Occupancy (NSO) stipulations from 45,046 acres to a whopping 365,419 acres? This would leave a total of 332,173 acres, less than half the Resource Area, available for lease with any type of surface occupancy. (86, 95)

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- Response: Two hundred twenty five thousand, one hundred six acres have been eliminated from NSO. This leaves approximately 161,648 acres covered as NSO. Many of the NSO stipulations for protection of individual resources overlap each other. The increase in NSO is used to protect the following: rivers, Rifle Mt. Park & Glenwood fish hatcheries, Bull Gulch ACEC, Colorado River SRMA, Eagle River SRMA, Sunlight Peak area, Hack Lake, Thompson Creek ACEC, Deep Creek ACEC, raptor nests, and sage grouse leks.
58. Comment: Current management allows leasing with surface occupancy on over 90 percent of the Resource Area. To make matters worse, the BLM proposed Controlled Surface Use stipulations on 670,000 acres, as well as Timing Limitations on over 717,000 acres. These restrictive stipulations appear to be proposed for application at least twice on every acre available to leasing with surface occupancy. The GSRA management appears intent on paralyzing any type of oil and gas problem in the area. (86)
- Response: The stipulations are necessary to protect resources. There are five major river corridors (Colorado, Eagle, Crystal, Frying Pan, Roaring Fork) along with the I-70 corridor (from one end of the RA to the other) that require stipulations for protection of wildlife, riparian, recreation, and visual resources.
59. Comment: The Timing Limitation stipulation relative to big game allows for "operation and maintenance" of production facilities. What does this mean? Capability for redrilling a well? (90)
- Response: The passage referenced should state that "routine operation, maintenance, and emergency operations would be allowed." Routine operation would not include deepening a well. Routine operations are generally those performed by one or two people from a pick-up truck type vehicle or an oil hauling truck. The various types of "routine" operations associated with a given type of production are considered at the APD approval stage and if operations affecting stipulated wildlife more than described in this EIS are anticipated, a decision will be made at that time as to what limits to place on such operations. If impacts will exceed RMP amendments, the plan may need to be further amended, or mitigation incorporated into the APD, etc.
60. Comment: While we do not believe that an EIS should accompany each lease, these off-site impacts should be considered on a site-specific basis during subsequent stages of the approval process. (92)
- Response: Concur--as stated, a site-specific environmental analysis is written on each APD.
61. Comment: We are opposed to the proposed stipulation which would require oil and gas lessees to compensate for the loss of crucial habitat, as proposed by the Glenwood Springs Resource Area. Compensation could be required either on-site or off-site--decision for which would be made on a case-by-case basis. (86, 89, 93)
- Response: We concur that the stipulation as shown in the DEIS is not necessary for resource protection. See revised text.

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62. Comment: Will BLM require "minor inventories" by a qualified botanist at the time of year these species can be identified during the site-specific environmental analysis phase for APDs under all leases? If not, BLM should state how it will provide protection under this "policy." (90)
- Response: The BLM requires surveys by its own staff or one by an approved consulting firm.
63. Comment: A No Surface Occupancy stipulation should be used to mitigate potential significant impacts resulting from loss of mountain shrub habitat. This recommendation is also relevant to riparian vegetation which is also not protected under any of the Alternatives. (90)
- Response: Riparian/wetland zones are protected with a 500-foot buffer zone. NSO stipulations are used in some areas, i.e., Colorado River SRMA. Relocating well pads 200 meters and developing COAs to meet the specific resource needs will provide adequate protection.
64. Comment: Colorado BLM places undue reliance on seasonal stipulations (which do not apply to operation and maintenance phase of oil and gas activities); Conditions of Approval (which are not always attached to drilling permits); and No Surface Occupancy stipulations (which are subject to waiver, modification and exception) in protection of wildlife habitat and other resources. Moreover, all these stipulations require and assume that enforcement will be effective, and we have legitimate doubts as to BLM's ability to provide the necessary oversight. (78)
- Response: We believe the necessary systems are in place to ensure application and enforcement of necessary mitigation. These systems have been more fully described in the final. The plan decision reflects our confidence that the mitigation is justified, necessary, and will be applied and enforced. Failure to apply and enforce mitigation required by the plan would be a violation of the plan and could render the lease or APD invalid.
65. Comment: There appears to be inconsistencies among RAs regarding lease restrictions pertaining to ungulate fawning/calving habitats. Mule deer, common to all RAs, are not listed by any RA as a species needing any protection during periods critical to reproduction. (87)
- Response: See uniform stipulation, Appendix E, which applies to all Resource Areas.
66. Comment: No Surface Occupancy stipulation #1 for protection on breeding habitat only includes a one-quarter mile buffer zone around the lek (strutting ground) when "nesting activity takes place within two miles of strutting grounds." How does this stipulation protect sage grouse populations? (90)
- Response: See uniform seasonal limitation for sage grouse, Appendix E.
67. Comment: The DEIS states that "Species of High Federal Interest are protected either with stipulations or COAs." Please define "Species of High Federal Interest." The stipulations provided in the DEIS do not protect all of the Federal Candidate species. (90)
- Response: BLM will add appropriate COAs when the APD is approved in order to protect the resource present.

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68. Comment: The ability to place protective measures on wildlife habitat after a lease is issued is severely limited. Please explain how COAs would be used to require that pads and roads not be allowed in large wetland habitats (i.e., wet meadows, riparian areas, etc.). (90)

Response: Our ability to protect wildlife habitat after lease issuance is very broad. First, through our analysis and stipulation of the lease contract, and secondly, through requirements in all lease documents to comply with law and regulation. Example of laws that most often affect operations are the 1979 Archaeological Resource Protection Act (ARPA) and the 1973 Endangered Species Conservation Act, as amended, just to name two. The BLM has authority to require any measure reasonable to comply with law. That authority is contained in the lease document (see DEIS Appendix C, page 2, Figure C-1, first paragraph of the last block section of Form 3100-11 [June, 1988]). For those wildlife species not specified in a leasing stipulation or protected by specific legislation, the BLM has authority under Section 6 (of the lease form referenced above) to require reasonable mitigation and/or inventory as needed to protect "other" (i.e., non-oil and gas) resources. This regulatory authority is further defined in 43 CFR 3101.1-2 (see quotation in DEIS, Page C-1).

69. Comment: Another serious concern with the proposed stipulation is its vague wording--how are "adverse impacts" going to be defined and predicted in advance? Such vague wording will very likely lead to confusion and the unwarranted use of this stipulation. (95)

Response: See revised Appendix E.

70. Comment: No Surface Occupancy stipulations are cited as the method for protecting crucial wildlife areas and vegetation. It is our understanding that these stipulations are frequently waived at the request of developers and consequently offer little real protection. If an area is to be truly protected, it should not be leased. NSO stipulations should not be waived. (97)

Response: Your understanding is incorrect. The BLM in Colorado has never waived a wildlife NSO stipulation. Upon request of the operator, the Authorized Officer may grant an exception to an NSO stipulation based upon criteria described in the appendix covering stipulations. Waiver of an NSO stipulation would require a plan amendment with appropriate public notice.

71. Comment: We are extremely anxious due to restrictions being placed on exploration, drilling and development activities during the time that wildlife are having their young, yet there are no similar stipulations to protect livestock or critical lambing and calving grounds for the same justifications. (98)

Response: According to BLM policy, a lease stipulation is not necessary for resource protection where a Timing Limitation is 60 days or less, or where you desire to relocate the proposed operation 200 meters or less. Such mitigation is within the definition of reasonable measures, an Authorized Officer may deem necessary to protect other resource values or uses under the terms of the lease (specifically, section 6 of the standard lease form) and the regulations at 43 CFR 3101.1-2. This is a very clear demarcation between when a lease stipulation is required and when alternative mitigation can be equally effective.

The BLM has afforded protection to lambing areas under Conditions of Approval (COAs) in Appendix F. (See page F-1 of the DEIS.) These COAs will be attached to Applications for Permit to Drill. Lessees will be

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notified of the COAs by lease notices at the time of lease issuance. This same policy applies to wildlife mitigation where conflicts occur for less than 60 days. See page F-1 Appendix F for COAs common to two or more Resource Areas.

72. Comment: Where is compliance with 404 b(1) guidelines of the Clean Water Act and Federal Executive Orders which provide direction to BLM for protection of floodplains, etc.? (90)

Response: Oil and gas operators are required by both the terms of the lease and the COAs of the permit to drill to comply with all other federal regulations and state and local requirements. This requirement included compliance with the U.S. Army Corp of Engineer's permits for structures involving navigable streams (see lease term in Appendix C and "Other Agency Approvals" in Appendix D).

73. Comment: Use of stipulations to protect high value surface resource lands, especially the NSO stipulation, does not avoid the conflict between oil and gas and other resources, it only delays the day that tough decisions will have to be made. (81)

Response: NSO has been chosen to allow multiple use. Protection of other resources can be protected if no surface disturbing activities are allowed.

74. Comment: Our conclusion was that whenever any planning was to be made concerning federal minerals covered by fee surfaces that those landowners would be contacted for their input. (98)

Response: Under the Federal Land Policy and Management Act of 1976 (FLPMA), the BLM is responsible for public lands which also includes the mineral estate under private surface. In discharging its FLPMA duties on split estate lands, the BLM must consider the management of the federal minerals (exploration and development). When BLM authorizes exploration and/or development, they must consider environmental impacts to the lease and adjacent lands under the National Environmental Policy Act (NEPA). These impacts may require mitigation on split estate at either the lease stage or development stage. The level of federal mitigation will be determined by the BLM through coordination with the surface owner.

Your concern about being involved in the planning process is valid. The BLM is required to involve the public in all of our planning documents. This oil and gas EIS included public involvement at the scoping meetings which were announced in the *Federal Register* on March 13, 1989. The BLM has also requested public comments on the DEIS which you commented on. The final EIS will also be sent to you.

75. Comment: Why have Irish Canyon ACEC and Lookout Mountain ACEC not been given the same degree of protection (NSO stipulations) as the other ACECs that were set aside to protect sensitive plant communities? (83)

Response: BLM determined avoidance stipulations will provide adequate protection to the resource. Site-specific inventories will be required prior to a surface-disturbing activity. We determined that oil and gas leasing and development can occur without damage to sensitive plant communities. A complete analysis of the rationale for protecting the ACECs can be found in the Little Snake RMP. (See Appendix 22 of the Draft RMP and also pages 2-61 and 2-62.

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76. Comment: The BLM should require that any company drilling in this area must pay for BLM surveillance and protection of cultural sites. (83)
- Response: BLM does not routinely perform surveillance operations. We do require the operator to hire an approved cultural resource contractor for inventory and monitoring when necessary.
77. Comment: The plan does not treat all SRMAs equally. The KRA has NSO stipulation for its SRMAs. (83)
- Response: Each SMRA is unique and is protected with its own unique mitigation.
78. Comment: No mention in the plan is made for the Eagle River SRMA. Has this area been given a NSO stipulation? (83)
- Response: The Eagle River SRMA is proposed for a NSO stipulation, but was inadvertently omitted from the listing. This SRMA has been included in the list for NSO stipulation.
79. Comment: The plan claims that all areas over 40 acres designed for protection of paleontological resources will receive a NSO stipulation. This plan, however, does not provide a list of these areas. (83)
- Response: Last sentence of paragraph 4; PALEONTOLOGY, All Alternatives, was rewritten to read "This stipulation is used on leases issued in the Cretaceous Ammonite site in the KRA."

Chapter 3 Comments

80. Comment: Is there any old growth timber that could become an issue? (99)
- Response: No.
81. Comment: Add more information about the semi-desert shrub community like those of other community types. It comprises 20 percent of the vegetation in the GSRA and is important wildlife habitat. (92)
- Response: The amount of information in Chapter 3 is directly related to the significance of the impacts. No significant impacts were identified, therefore, the description is adequate.
82. Comment: Does the definition of "riparian community" include wetlands? (90)
- Response: Yes
83. Comment: Wetland locations are not identified in the DEIS for the GSRA. How will these habitats be protected by BLM and how will 404 b (1) guidelines under the Clean Water Act interface? (90)

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- Response: An inventory of riparian and wetland areas was carried out from 1977 to 1979 in the GSR. Although this did not cover 100 percent of the wetland/riparian areas, it is fairly complete. This information is available in the GSR office. The stipulation requiring protection of an area extending 500 feet from the edge of the riparian/wetland and upland should protect most of these sites. Like the analysis required by 404 b (1) guidelines under the Clean Water Act, BLM will not allow drilling activities where practical alternatives exist. Again, the riparian/wetland protection stipulation should virtually eliminate adverse impacts.
84. Comment: Clarification is needed on definition of "irrigated meadow" which is one of the four major vegetation types described (13 percent) in the KRA. Please state whether these meadows are considered wetlands, and if so, by what agency. (90)
- Response: The 14 percent "irrigated meadow" is not considered true wetlands within the KRA. These meadows or croplands were sagebrush areas that have been converted to hay pasture. These areas produce the stable hay grasses which provide critical winter feed for domestic livestock.
85. Comment: Vegetated communities listed on Table 3-3 should be discussed in the narrative to highlight importance of each as is done for the other resource areas. (92)
- Response: See revised text.
86. Comment: Table 3-4 should be amended. Rare plant inventories in Dinosaur National Monument have identified nearly 40 species of special concern. Those which are federal candidate species, in addition to the species listed in Table 3-4, include park rockcress (*Arabis vivariensis*) and alcove bog-orchid (*Habenaria zothcina*). Some other Category 1 and 2 species may occur in the Little Snake Resource Area, most notably Ladies' tresses orchid (*Spiranthes diluvialis*) and rock hymenoxys (*Hymenoxys lapidicola*). (91)
- Response: It should be noted that BLM sensitive plants consist of only those plants known to occur on public lands (BLM surface) within the LSRA. You reference the rare plants inventories in Dinosaur National Monument, these inventories have not established the existence of additional species on the LSRA.
87. Comment: The DEIS states that "riparian communities, although limited in quantity and quality, provide habitat for a large number of wildlife species and represent a highly important resource within the Resource Area." The FEIS needs to clarify why the "quality" of the riparian vegetation community is "limited." Is it due to grazing, water diversions, etc.? (90)
- Response: The statement of riparian communities are limited is a factual statement about the overall riparian communities in the LSRA. These communities will not be impacted by the Proposed Action. It would be beyond the scope of this document to determine the condition of the riparian communities or what contributed to the condition.
88. Comment: The discussion on livestock grazing is inadequate and should be expanded to compare this use on the five Resource Areas. The impact of leasing on livestock use is considerably greater than that on air quality, yet climate and air quality receives three pages of narrative. (92)
- Response: See revised text.

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89. Comment: In some cases, BLM is unaware of the wildlife resources on some of the lands open to leasing in the Study Area. (78)
- Response: The BLM admits it does not know the location of every species or individual on over 3 million acres. It is doubtful if anyone knows, or will ever know, all of the different species' exact location at any given point in time. Wildlife tend to wander over large areas constantly and to claim that their location is known would be highly suspect.
90. Comment: I also understand a very unusual species of fish is found in the Cross and Cahone Canyons. No mention of this fish is made in the report. (83)
- Response: A fish species has been captured in Cross Canyon that is currently being analyzed by Colorado Division of Wildlife (CDOW). The CDOW has indicated that "the fish appears to be a *Fundulus zebrinus* with a highly unusual color pattern." No mention is made of this particular fish because it is not yet known if it is a new species or a variety of a known species.
91. Comment: More explanation of "crucial habitat" is needed. How does this relate to CDOW's WRIS definition of "critical habitat?" Winter concentration areas are very important but are not mentioned here. (92)
- Response: Crucial winter habitat include severe big game winter range or other definable winter ranges as mapped by the CDOW. Big game winter concentrations occur on public land and are included in crucial winter habitat areas.
92. Comment: Habitat may be a limiting factor to black bear populations in the Kremmling (one percent of total habitat) and Glenwood Springs (20 percent) Resource Areas. Cumulative adverse impacts due to loss of habitat and displacement during the late summer-fall period may be significant. (90)
- Response: See revised text.
93. Comment: Since a complete inventory of critical wildlife habitats has not been conducted, explain how these areas will be protected from road and other associated construction-related impacts due to development of oil and gas leases. (90)
- Response: Crucial wildlife habitat areas have been identified within each Resource Area, and appropriate mitigation has been proposed.
94. Comment: Since BLM has not conducted an inventory which defines locations for these species and no special stipulations are provided in Appendix E to protect unknown sites, BLM should state how it proposes to afford these plant populations protection from development. (90)
- Response: All T&E species are fully protected by the Endangered Species Act which is a part of the oil and gas lease. Inventories during the appropriate time of the year will be required.
95. Comment: Due to the data gaps for emphasis species, how will new crucial habitats discovered during the site-specific environmental analysis process required for APDs be protected? (90)

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- Response: During the environmental analysis on the APD, newly discovered habitat can be protected with COAs under the authority of the Endangered Species Act which is a part of the lease. Other habitats would be protected under Conditions of Approval.
96. Comment: Will discovery of a sage grouse strutting lek during the APD field review trigger an amendment to the EIS? (90)
- Response: Additional information on sage grouse leks will not result in amending Resource Management Plans.
97. Comment: The DEIS describes the KRA as providing "habitat for approximately 310 species of animals, including 220 birds, 60 mammals, 20 fish, seven amphibians, one reptile and three domestic herbivores." Yet, the DEIS only describes crucial habitats for big game, upland game birds, waterfowl, and raptors. (90)
- Response: The KRA addressed the crucial habitats where large scale projects could impact concentration areas of big game, upland game birds, waterfowl, and raptors. Other wildlife species are mobile or widespread over diverse habitats and are not expected to be impacted. The Proposed Action would impact less than one percent of the KRA and many potential impacts can be avoided with COAs developed at time of project design and review.
98. Comment: The Affected Environment section does not mention other small species which may be rare or sensitive. One such species is the spotted bat (*Euderma maculatum*), whose status is largely unknown. The only known records of this species in Colorado are in or near Dinosaur National Monument. (91)
- Response: Only those wildlife species that have the potential to be significantly affected by oil and gas development were discussed in the Affected Environment. Because the spotted bat is rare and the only known records of the species are in areas that have a very low probability for oil and gas development, it was determined that there is an extremely low potential for impact.
99. Comment: Important bird species include bobwhite quail, turkey, and pheasant. (92)
- Response: These bird species were not considered to be significantly impacted from oil and gas exploration and development activities because of their life cycle habitat requirements and distribution.
100. Comment: The discussion of big game animals should be expanded to highlight important habitat on BLM land. (92)
- Response: Big game habitat areas are delineated on maps available at the Resource Area Office.
101. Comment: The DEIS identifies current uses of BLM land, yet fails to analyze cumulative effects to wildlife and other resources resulting from additional impacts associated with oil and gas leasing development. (90)
- Response: See revised text.
102. Comment: The last paragraph on page 3-6 is poorly written with no lead into T&E plant species. Classification is needed. (92)
- Response: See revised text.

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103. Comment: A paragraph explaining T&E species in the KRA is needed to complement Table 3-2. Are state listed plant species of special concern inventoried by the Resource Areas? (92)
- Response: See revised text.
104. Comment: The threatened and endangered species section should receive consistent treatment for each planning area. For example, there should be a table for each resource area, similar to Table 3-90 prepared for the Northeast Planning Area. Each planning area should include those lists of species provided by the FWS to the BLM on June 16, 1989. The razorback sucker was proposed for federal listing on May 22, 1990, and is therefore no longer a candidate species. (96)
- Response: See revised text.
105. Comment: It is unclear how BLM is planning to protect instream habitats for A and B populations of Colorado River cutthroat trout when development is not restricted in these watersheds or in the riparian zones. (90)
- Response: All T&E species are protected by the Endangered Species Act. Watersheds and riparian zones are protected by various mitigative measures (see Appendices D and E).
106. Comment: Federal candidate species which occur within the KRA include Colorado cutthroat trout, Boreal western toad, white faced ibis, and ferruginous hawk. BLM should state how it will protect potential habitat for these species. There is no mechanism to protect their habitats if discovered during the APD review process. (90)
- Response: Habitats for Colorado cutthroat trout (streams), Boreal western toad and white faced ibis (both riparian) can be avoided by 200 meters during the development or review of the surface use plan of the APD. There is a NSO stipulation for ferruginous hawk nests.
107. Comment: Table 3-8 fails to include the peregrine falcon (*Falco peregrinus*). There is at least one documented site which has been occupied since 1988. This information should also be included in the discussion of threatened and endangered species. (91)
- Response: See revised text.
108. Comment: In the discussion of the bald eagle (*Haliaeetus leucocephalus*), the document should note that significant roosts occur in Lily Park on BLM, NPS, and private lands. (91)
- Response: See revised text.
109. Comment: The discussion on endangered fish should be expanded to reflect the proposed listing of the razorback sucker (*Xyrauchen texanus*) as endangered. The humpback chub (*Gila cypha*) has been reported in Cross Mountain Canyon and in the lower reaches of the Little Snake River. We suggest that the Colorado Division of Wildlife (Tom Nessler, 303/484-3836) and the Fish and Wildlife Service (Dr. Harold Tyus, 801/789-0354) be contacted to acquire the most recent information on the location and status of the endangered fishes. (91)
- Response: See revised text.

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110. Comment: The process of identifying potential black-footed ferret reintroduction sites will occur throughout all of Colorado. Consequently, we believe this paragraph should recognize the evaluation of candidate sites will eventually occur in all of the planning areas discussed in the EIS, not only northwest Colorado. Prairie dog abundance may be more than adequate to support black-footed ferrets in many other Resource Areas. (96)
- Response: The LSRA is the only area involved in this EIS where the potential exists for black-footed ferret reintroductions, based on current information.
111. Comment: We recommend NSOs for the Osterhout milkvetch and Penland beardtongue in the KRA, and the Gibbens beardtongue in the LSRA. Maps showing the recommended NSOs are attached. These species have been adequately surveyed and known populations of high concentrations delineated. (96)
- Response: These populations in KRA will be added to the NSO stipulations. Known plant populations for candidate species will be surveyed by a competent botanist to establish locations prior to any authorized activity. The populations will be protected as detailed under conditions of approval.
112. Comment: We have published a new candidate plant list February 21, 1990, in the *Federal Register* (55 FR 6184). Since we sent you a previous species list on this project on June 16, 1989, we are therefore sending you an updated plant candidate list. (96)
- Response: See revised text.
113. Comment: The document notes that the "Mexican spotted owl has been reported in Mesa Verde." The spotted owl (*Strix occidentalis*) has been found within Mesa Verde National Park by the Forest Service Region 2 Spotted Owl Survey Team. With this confirmed observation of spotted owls within the park, there is the possibility that the spotted owl may also be found on Weber and Menefee Mountains. Justification exists for a formal survey of the Weber and Menefee Mountains Wilderness Study Area (WSA) as spotted owl habitat. (91, 92)
- Response: There was a survey done in 1984 on Menefee Mountain for spotted owls. This survey revealed the presence of the species. However, Menefee and Weber Mountains are currently in a "No Lease" status due to the WSAs. At the time that Congress designates wilderness, if Menefee and Weber Mountains are not designated, they will become No Surface Occupancy (NSO) areas. Therefore, if leases are issued on either mountain, lease development will have to occur by occupying the surface outside the designated NSO boundary. Because no occupancy is proposed to be allowed on either mountain, there is no justification at this time to conduct a formal survey.

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114. Comment: The discussion on threatened and endangered species mentions only vertebrates. There is no reference to threatened and endangered plant or invertebrate species or the status of respective candidate species. Of specific concern are several candidate plant species that may be found in the Weber and Menefee Mountain areas near Mesa Verde National Park. Species that should be evaluated include:
- Mesa Verde false forget-me-not (*Hackelia gracilentia*)
 - Mancos milkvetch (*Astragalus humillimus*)
 - Small flowered penstemon (*Penstemon parviflorus*)
 - Spurless Mancos columbie (*Aquilegia micrantha mancosana*)
- These are just four of an extensive list of plant species that should be surveyed prior to any land status change or leasing in the area. (91)
- Response: T&E plants are listed in Table 3-6. This list was supplied by U.S. Fish and Wildlife Service. Small flowered penstemon is the only species not listed. Menefee and Weber Mountains are designated as NSO areas. Therefore, these species would not be impacted.
115. Comment: Additional clarification and documentation needs to be provided before it is reasonable to assume that no route of communication exists between shallow aquifers and coals at depth. The geology of the area basin margins needs to be documented. (88)
- Response: The relationship between shallow aquifers and coals at depth (eg., Fruitland coal) are extensively studied and continue to be studied. To date, there are no indications of communication of groundwater or gas between the Fruitland Formation and any known shallow aquifer. There are many hydrocarbon sources in the San Juan Basin and some shallow sources, as well as biologically generated gas may be the source of gasses found in some local water wells.
116. Comment: What are the current and anticipated uses of the deep, bedrock aquifers in the project areas? (88)
- Response: Waste water injection is the only use presently being made of the deepest aquifers in the San Juan Basin because the water in these aquifers (notably the Morrison Formation sands) is too saline for other uses.
117. Comment: Other than groundwater salinity values, what additional ambient water quality values are available? (88)
- Response: Ambient water quality values are available in Resource Area files for a number of constituents. These statistics are supplied by agencies other than the BLM or by oil company drilling and completion reports. Listing of all ambient water quality data in this document would be costly and add nothing to comprehension of adverse impacts of oil and gas development on groundwater.
118. Comment: In general, this document provides inadequate documentation of current groundwater hydrology without which is not possible to adequately document the nature of the physical system under consideration. Current water quality data is also lacking in this document. Without such information, it is difficult to reach an informed decision as to the reasonableness of the levels of impacts anticipated as a result of project activities. (88)
- Response: See revised text.

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119. Comment: We recommend that the Hovenweep Cooperative Management Strategies area and Dinosaur National Monument's Harpers Corner Road area be added to the Class II VRM listing, and that the Mesa Verde rim be moved to the Class I VRM listing. (91)
- Response: Changing VRM designations is outside the scope of this plan amendment/EIS. The San Juan/San Miguel RMP is scheduled for updating in 1995, at which time, the issue could be revisited. In addition, this area is the "East Cortez" NSO area and no surface disturbing activities would be allowed to take place in the area. Dinosaur National Monument's Harpers Corner Road is outside of the area under analysis in this document.
120. Comment: Mesa Verde National Park is designated as a Class I area under the Clean Air Act of 1977, as amended. The DEIS lists the visual air quality of the BLM lands along the border of the park as "VRM Class II." The VRM classes as listed, even though explained, are confusing. They could be read as Air Quality Act designations. This is confusing to use and likely confusing the general public. (91)
- Response: Nothing in the DEIS discusses "visual air quality" of BLM lands. VRM class guidelines dictate levels and locations of surface disturbance. Activities in Class II areas must be "may be seen but should not attract attention" to the casual observer. Air quality has nothing to do with VRM. The DEIS has two separate headings which discuss the separate resources.
121. Comment: There are several maps included in the document, but only a very few identify NPS units or other areas of NPS concern. We recommend that these areas be included in all appropriate maps in the final EIS. (91)
- Response: The NPS areas will not be subjected to impacts, and therefore, were not included.
122. Comment: Maps should show the name of the Resource Area and be included on all maps of that Resource Area. (92)
- Response: See revised maps.
123. Comment: Map 3-2 incorrectly delineates the boundary of Rocky Mountain National Park. The map shows the pre-1980 boundary. (91)
- Response: See revised map.
124. Comment: The wild and scenic river study for the Yampa River has been completed. (92)
- Response: A formal study for the portions of the Yampa River within BLM's jurisdiction has not been completed. These segments have been inventoried and are listed in "The Nationwide Rivers Inventory" as suitable for study. The BLM plans to do this study as soon as funding becomes available.
125. Comment: Page 3-40 notes that the Yampa River constitutes a sensitive visual resource. We recommend expanding this section to note that Dinosaur National Monument and adjacent lands are also quite sensitive and vulnerable to degradation of visual resource and values. Oil and gas development adjacent to the Dinosaur National Monument could severely diminish the value of views from the park. (91)

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- Response: Lands adjacent to Dinosaur Monument, including views from the Monument, have been placed in a VRM management class. The Little Snake RMP provides for protection of the visual resources. Oil and gas development within these lands will not be allowed to degrade the established VRM management class. Impacting the visual resource of Dinosaur National Monument should not be a concern as the mineral estate within the Monument is not subject to the Mineral Leasing Act.
126. Comment: The cultural resources addressed in this section are specific to site that are listed on the National Register of Historic Places. The four separate cultural sites located in the Colorado portion of Hovenweep National Monument were not included in the list provided. In fact, the existence of the park was not addressed in the cultural resource section at all. Except for the passing reference to No Surface Occupancy (NSO) made in Table 4-1 on page 4-21, the existence and location of Hovenweep sites within Colorado were not addressed. (91)
- Response: BLM does not manage National Park Service lands and therefore has no authority to plan for them nor responsibility to manage them. The NSO stipulations are for BLM-managed segments around the monument sites and are considerations provided for NPS management goals (primarily visual) for the monument areas. The NSO designated buffer zones around these sites certainly recognize their existence.
127. Comment: Some of the wilderness study areas may be adjacent to the old RARE II or roadless areas on the National Forests. The BLM and FS should coordinate the study of these areas to ensure that topographical boundaries are considered and not agency boundaries. (99)
- Response: This has occurred on the local level.
128. Comment: The map locations of Weber and Menefee Mountains have been reversed. (91)
- Response: See revised map.
129. Comment: New Raymer is misspelled on page 3-58. (92)
- Response: Concur.
130. Comment: The Area of Critical Environmental Concern (ACEC) located on Map 3-30 should be extended eastward to include the North Rim Escarpment north of Mesa Verde National Park. (91)
- Response: The ACEC will not be extended to include the North Rim Escarpment of Mesa Verde. The area listed as "East Cortez" on page 3-45, in Table 4-1 on page 4-21, and in Appendix E on page E-5 covers the lands under the North Rim of Mesa Verde.
131. Comment: An oversight in Chapter 3 is the lack of identification of caves as an issue. (90)
- Response: The Federal Cave Resources Protection Act of 1988 (PL 100-691) requires the BLM to protect significant caves. Cave bearing areas in the GSRA exist in limestone and dolomite geologic formations. These areas are in low potential areas for oil and gas. Caves were identified as a value in the Deep Creek SRMA/ACEC. These caves would be protected in the Proposed Action alternative with No Surface or Subsurface Occupancy stipulations.

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132. Comment: Table 3-11 note that several WSAs are recommended as non-suitable for wilderness designation. A change in action away from the current WSA management would allow for oil and gas development and impact the resources or values of nearby NPS units. We do not believe that the document provides the rationale for these recommendations and we question their validity. (91)
- Response: The recommendations for non-suitable designation was presented and analyzed in the appropriate Wilderness EIS that has been completed in each BLM District.
133. Comment: The EIS does not differentiate between coal bed methane and natural gas. (124)
- Response: Coal bed methane is a natural gas which is produced using the same technology as other natural gasses. We have added a new section to the DEIS, Appendix B, which discusses in more detail various types of oil and gas production, including methane.

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134. Comment: Near Cedar Hill and Bondad there are 180 water wells and 57 have hydrocarbons in them from the coal bed methane gas. (123)
- Response: Freshwater aquifers are not depleted or impacted by oil and gas drilling. Aquifers are cased and cemented across to prevent loss of oil or gas to the aquifer and to keep from having to handle quantities of water getting into the produced fluids. The cementing off of freshwater zones is also done to prevent any pollution of the groundwater.
135. Comment: The BLM needs to discuss depletion of the aquifers and mitigation (123)
- Response: See revised text.
136. Comment: The EIS needs to address the problem of fracturing out of the intended zone. (123)
- Response: See revised text.
137. Comment: BLM should analyze the fact that water depletion actually allows gas production. (123)
- Response: See revised text.
138. Comment: EIS did not address gas migration due to hydrostatic pressures. (124)
- Response: See revised text.
139. Comment: Need additional studies to measure gas migration and also water migration. (124)
- Response: See revised text.
140. Comment: Disposal of toxic wastes was not described and it should be. (124)
- Response: See revised text.

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141. Comment: What are the impacts of a cathodic well that punctures a water course? (124)
- Response: To date, BLM has not approved any cathodic protection wells on any public lands within the Planning Area. If BLM were to receive an application for such approval, an analysis of local groundwater conditions would be made to determine if the cathode could be placed so as not to affect local groundwater. The same principles applied to approval of oil or gas wells would be applied to a cathodic well.
142. Comment: We recommend changes to the EIS to recognize the implications the ferret reintroduction process may have on the management of prairie dogs on BLM lands. (96)
- Response: See revised text.
143. Comment: In an area of existing oil wells, a coal company could pre-negotiate an agreement, realize those costs beforehand, then make economic decisions on the project. At least their mining plans could include the loss of coal around the wells. The oil company would have the first in time, first in right priority. (82)
- Response: See revised text.
144. Comment: Environmental Consequences, needlessly exaggerates and/or misrepresents potential effects of oil and gas exploration and development activities on surface resource values. Neither standard nor special stipulations are explained or discussed; yet they are designed to significantly reduce or eliminate nearly all of the impacts identified. (86)
- Response: See revised text.
145. Comment: The Proposed Action violates NEPA requirements to analyze the environmental impacts of the oil and gas leasing prior to leasing because of its lax treatment of exception criteria. The EIS does not analyze impacts of surface disturbing activities on the NSO areas. If an exception is granted, the impacts are not analyzed and no public review is required. (76,108).
- Response: Refer to Appendices D, E, and F for revised exception criteria which are much more specific. If an exception is considered, the NEPA analysis will be done at that time and all impacts will be identified. It is impossible to identify impacts at this time without any proposals to consider for exceptions.
146. Comment: Environmental Consequences exaggerates the potential effects of oil and gas activity on other resource values. Standard and special stipulations are designed to mitigate environmental consequences, yet this was never discussed. (93)
- Response: See revised text.
147. Comment: Chapter 4, "Environmental Consequences," exaggerates and misrepresents the impacts from oil and gas activities because it does not discuss the requirements and protections provided through the use of standard and special lease stipulations. (95)
- Response: See revised text.

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148. Comment: The DEIS appears to be heavily weighted in favor of non-commodity uses such as wildlife habitat, cultural resources, and recreation. (93)
- Response: The BLM is required to manage all resources. We have attempted to protect "non-commodity" resources and at the same time provide adequate availability for recovery of "commodity" resources.
149. Comment: The Final EIS should also describe how impacts associated with oil and gas drilling and production will be monitored. (92)
- Response: See revised Appendix A.
150. Comment: It should also explain how mitigation can be modified, if necessary, to reduce unexpected impacts to the environment. (92)
- Response: Concur, see the explanation in the DEIS, Appendix D, page D-1, the second and third paragraphs.
151. Comment: We recommend that the Final EIS acknowledge and evaluate potential "off-site" impacts to sensitive or important areas, or that it include a commitment to complete such an investigation before drilling begins. (92)
- Response: See revised text.
152. Comment: The DEIS states that impacts to riparian and wetland habitats would not be significant." This conclusion is based on avoidance of development in these critical areas through the use of Conditions of Approval (COAs) during predrill inspections. This would include moving well site locations up to 200 meters to avoid construction in riparian and wetland. This conclusion that impacts would not be significant is without basis. (90)
- Response: See revised text.
153. Comment: The BLM has made assumptions of no or minor impacts in a number of areas in this document. Where such assumptions have been made, often inductively, no methods have been incorporated for monitoring to insure that the levels of impact anticipated are actually achieved. (88)
- Response: The BLM currently, and will continue, monitors all impacts of all actions that occur on public lands.
154. Comment: We object to the BLM's failure to discuss potential effects which could reasonably occur during seismic activities. (86)
- Response: See revised text,
155. Comment: What is not known is what the impacts on a specific parcel will be. How can the public and BLM land managers make informed decisions on whether a particular parcel should be open to oil and gas development if the impacts to this particular parcel are not known? When looking at the impacts on a specific site, the BLM must consider all stages of development through full-field production. (81)
- Response: Impacts through full field production were considered. Site specific impacts can only be determined when a site specific proposal is received. These site specific impacts are analyzed when an APD is submitted.

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156. Comment: We are concerned that the BLM did not consider in this DEIS the impact of surface management oil and gas exploration and production. It seems the DEIS heavily restricts oil and gas activities through surface management without adequate justification as suggested in the SPG. (79)
- Response: See revised text.
157. Comment: A recent report by the Interior Department's Inspector General seriously challenges BLM's assumptions regarding effectiveness of mitigation and reclamation. (78)
- Response: The Colorado BLM record for mitigation and reclamation is excellent. The IG found no problems in the resource area visited in Colorado, and we would expect the same results from similar reviews elsewhere in Colorado.
158. Comment: What effect does the PSD classification have on the SJ/SMRA. (126)
- Response: The DEIS states "... Congress established a system for the Prevention of Significant Deterioration (PSD) of "attainment" and "unclassified" areas. Areas are classified by the additional amounts of NO₂, SO₂, and TSP degradation which would be allowed" (page 3-4 paragraph 4). The specific incremental amounts of pollutants allowed the baseline are listed in Table J-4 (page J-3). Within the San Juan/San Miguel Resource Area, Mesa Verde National Park and a portion of the Weminuche Wilderness (as of August 7, 1977) are PSD Class I Areas. In addition to the specified Class I increments, Class I Areas also have provisions to protect "Air Quality Related Values" such as visibility, atmospheric deposition, noise, etc. Telluride and Pagosa Springs have a high probability of being nonattainment areas for PM₁₀. The remainder of the Resource Area is designated PSD Class II.
159. Comment: The air quality analysis in the Draft Environmental Impact Statement (DEIS) is inadequate. Individual oil wells can be major sources of air pollution, generating more than 250 tons per year of one or more regulated pollutants such as sulfur dioxide, hydrogen sulfide, nitrogen oxides, volatile organic compounds, and carbon monoxide. Nitrogen oxides and volatile organic compounds combine in sunlight to form ozone. The preferred alternative projects the opening of as many as 47 new oil fields and up to 1,789 new oil wells in the study area. The DEIS concludes that this development would have "very minor, short-term, and very localized" impacts on air quality. There is no mention of control technology to reduce the emissions of air pollutants, nor is there any mitigating measure or requirement to use that technology. (91)
- Since some or many of the 1,789 wells may be developed near class I or II, or category I or II areas, the final EIS should include an analysis of the potential air pollution impacts on these areas and their resources, as well as required control measures that will reduce the air pollution impacts. Mitigation measures that clearly describe the application of appropriate air pollution control technology should also be included in the final EIS. (91)

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- Response: The DEIS clearly states (page 1-5, paragraph 6) "If a decision is reached to lease under one of the alternatives in this EIS, additional actions will be required before on-ground operations begin. These actions include the submission of Applications for Permit to Drill (APD), Applications for Rights-of-Way (ROW), and Sundry Notices for other field operations. Development activities subsequent to leasing will have additional NEPA documentation prepared to assess site specific impacts within the range of significance identified in the plan." It is not possible to identify all potential air quality impacts (nor specify appropriate control technology) from a proposed oil and gas well until detailed information is available concerning that well (location, terrain, production, sulfur content, etc.). Under all circumstances, applicable federal, state and local air pollution standards (including PSD Class and Colorado Category I and II requirements) will be met, as required in FLPMA and the Clean Air Act.
160. Comment: "Very minor, local impacts" should be defined in light of the potential cumulative impacts of the proposed development. (92)
- Response: It is anticipated that potential air quality impacts from further proposed oil and gas development will be well within federal, state and local standards, and it is unlikely that potential impacts would have cumulative effects.
161. Comment: It would be helpful to know the number of acres of forest land impacted by oil and gas development. (92)
- Response: There are 107,000 acres of commercial forest in the entire Study Area. Less than one percent (1,070 acres) could be impacted.
162. Comment: It is unclear how the BLM arrived at the conclusion that approximately 78.8 acres (25 acres of which would be reclaimed) would be disturbed in any given year. (86)
- Response: See revised text.
163. Comment: On page 4-1, it is stated that wildcat wells would result in the loss of approximately 10 acres of vegetation per well, or a total of 19,200 acres (from 1,920 wells) over a 20-year period. Yet page 4-22 states identifies the projected number of wells as 1,789. The discrepancies do not end there. (86)
- Response: See revised text.
164. Comment: pg. 4-1 Vegetation (5th paragraph). The DEIS states that "to comply with requirements of the Endangered Species Act, all oil and gas activities would be cleared for species occurrence at the operational stage on a case-by-case basis rather than at the leasing stage." This appears to contradict the statements made on page 1-5 (2nd paragraph) that "This EIS will serve as the Biological Assessment when the Final EIS is published. The U.S. Fish and Wildlife Service do an additional Consultation under Section 7 of the Endangered Species Act on individual leases where T and E species occur?" (90)
- Response: BLM will ensure that there will be no effect on T&E species. BLM does not receive a site specific proposal until the APD is filed. An environmental assessment is prepared and impacts to T&E species are analyzed. The FWS is consulted at that time if there is any question as to effect or no effect.

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165. Comment: pg. 4-1 Vegetation (3rd paragraph) The DEIS identifies the maximum amount of vegetation that could be lost over 20 years from oil and gas leasing as 19,200 acres. The DEIS concludes that "this is not considered to be a significant cumulative impact." The basis of this conclusion is questionable when information on proportional impacts to the various vegetation communities is lacking. (90)
- Response: Critical vegetative types are protected by stipulations and COAs, therefore no significant impacts are anticipated.
166. Comment: The potential loss of the mountain shrub type should be addressed in Chapter 4, specifically for this Resource Area, under Cumulative Impacts as oil and gas development would have a significant impact on wildlife dependent species. (90)
- Response: Anticipated impacts in the mountain shrub community would be negligible and no special stipulations are necessary. Reference to this plant community will be deleted.
167. Comment: If these vegetative communities are so valuable for wildlife, the DEIS should analyze potential impacts from oil and gas leasing in Chapter 4. Adverse impacts from other existing uses (road building, construction, gravel extraction, water diversions and livestock grazing) should be analyzed under "Cumulative Impacts" in Chapter 4. (90)
- Response: See revised text.
168. Comment: The EIS should state how additional adverse impacts to riparian from oil and gas leasing and development will affect its value and function for wildlife, water quality, and channel stabilization. (90)
- Response: See revised text.
169. Comment: How would road construction be conditioned to protect riparian and wetland communities when filling of these area may be required to reach pad sites? (90)
- Response: Site specific engineering techniques will be used that result in the least impacts to riparian and wetland areas.
170. Comment: The DEIS does not have adequate analysis of impacts to riparian, wetlands, and aquatic habitats from use of this large quantity of water. Consequently, adverse impacts to fish and wildlife were not analyzed. (90)
- Response: See revised text
171. Comment: pg. 4-6 Continuation of Present Management Alternative (3rd paragraph) The DEIS states that "2) disturbance to aquatic and riparian areas, resulting in minor losses of both fish and wildlife habitat" would remain unmitigated under this alternative. The analyses used in the DEIS do not support the conclusion that "minor losses" would occur. (90)
- Response: See revised text.

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172. Comment: pg. 4-5 Aquatic/Wetlands/Riparian Habitats The DEIS states that potentially significant impacts to these habitats "would be minimized by limiting surface-disturbing activities within 500 feet of riparian wetland zones." If this is a mitigation measure, explain why there is no No Surface Occupancy or other stipulation provided in the DEIS to protect these habitats. (90)
- Response: No Surface Occupancy is not necessary. Appropriate mitigation is possible under the terms of the lease (Appendices D and F).
173. Comment: The DEIS describes how winter range, severe winter range, and crucial habitat acreage has been reduced in the past ten years and give projected loss due to development of private lands. Oil and gas leasing on BLM lands and potential significant impacts, due to the loss of additional habitat, should be addressed in the DEIS. (90)
- Response: See revised text.
174. Comment: We consider the stipulations for mitigating direct losses of wildlife habitat and values to be inadequate. Only the Glenwood Springs RA (pg. 4-3) proposed stipulations requiring compensation for losses of crucial habitats. (87)
- Response: See revised text.
175. Comment: Disturbance to wildlife should not automatically be considered an indirect impact. Oil and gas activity can and does have a direct impact through disturbance especially during nesting and birthing seasons. (92)
- Response: In the framework of the definition used, direct impacts are defined as affected individual animals that result in immediate mortality. All other impacts are considered to be indirect.
176. Comment: All Resource Areas should have lease stipulations requiring the oil and gas lessee to compensate for the loss of crucial habitat. A map of big game crucial habitat in all Resource Areas would be helpful. (92)
- Response: A stipulation requiring the lessee to compensate for loss of habitat is not necessary. See revised text.
177. Comment: pg. 4-4 (1st paragraph) Following the rationale as described in the DEIS, the reduction of big game winter range from oil and gas development cannot be mitigated through compensatory off-site habitat enhancement. This is due to shrub regeneration time of 15 to 20 years. (90)
- Response: Shrub regeneration was considered in the impact analysis.

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178. Comment: pg. 4-5, Right-hand column: What is "... the protection for T and E species." We believe it is premature to say that significant impacts to threatened and endangered species will not occur. Based on current inventories, there are 62,000 acres of prairie dog habitat in the Little Snake Resource Area. We are not aware of similar inventories in the other resource areas but suspect significant prairie dog acres in the San Juan/San Miguel Planning Area also. Consequently, we believe this section should recognize the guidelines for Oil and Gas Activities in Prairie Dog Ecosystems Managed for Black-footed Ferret Recovery being prepared by the Fish and Wildlife Service. It is not clear to us how the application of appropriate mitigation listed in Appendix D will preclude significant impacts. The key language in Appendix D, page D-7, development rights are not unduly hindered or precluded." (96)
- Response: Because development will be highly dispersed, there will be no significant impact on black-footed ferret reintroduction efforts. A special lease notice concerning the potential for black-footed ferret reintroduction is contained in Appendix E.
179. Comment: pg. 4-5 Threatened and Endangered Species and Species of High Federal Interest The DIES states that "all leases contain the protection for Threatened and Endangered species." Threatened and Endangered species are protected under the Endangered Species Act, not oil and gas leases. (90)
- Response: The oil and gas lease incorporates the Endangered Species Act and requires adherence. See Appendix C.
180. Comment: Page 4-2. This page states that "It has been determined through analysis that the Proposed Action Alternative will not have an effect on any of the threatened or endangered species found in the study area." This statement may be incorrect since inventories for the study area are incomplete and the document later states on page D-7 that protection of endangered, threatened, and sensitive plants would only be "to the extent such protection does not unduly hinder or preclude exercising valid existing rights" and "to the degree that existing development rights are not unduly hindered or precluded." Perhaps we did not find it, but we also did not see the analysis which might support the no affect statement. (91)
- Response: See revised text
181. Comment: Anticipated impacts to wildlife are not sufficiently documented. (88)
- Response: See revised text
182. Comment: Further loss of mountain shrub habitat from oil and gas development on dependent wildlife species is not analyzed for any of the alternatives or under cumulative impacts in Chapter 4 under Environmental Consequences. This is a deficiency that should be addressed in FEIS. (90)
- Response: See revised text
183. Comment: BLM's analysis for this EIS is inadequate under NEPA as it only analyzes impacts to sport/game species (deer, elk, sage grouse) and a few federal threatened and endangered species. (90)
- Response: Impact analysis is only for significant impacts to fish and wildlife habitat. Other fish and wildlife species not analyzed are not considered to be significantly impacted.

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184. Comment: With BLM's emphasis on only four wildlife species groups within this Resource Area, analysis of potentially significant adverse impacts to more localized rare species cannot be accomplished. (90)
- Response: No localized, rare species have been identified that could not be protected by either relocating proposed operations up to 200 meters or using a seasonal Timing Limitation of 60 days.
185. Comment: The level of oil and gas activity by the BLM does not support the claim that ungulates would be forced to compete for winter range due to oil and gas operations. Competition for winter range would more likely stem from overpopulation. (86)
- Response: Oil and gas development may have locally significant impacts, especially when considered cumulatively with other development on private, state, and other federal lands in the area of concern. When dealing with big game winter range, if an area is at carrying capacity, and a surface disturbing activity reduces that carrying capacity for big game, impacts to habitat on adjoining winter ranges can be reduced either by replacing the habitat values lost or by reducing the number of animals dependent upon the lost habitat. There are many problems associated with reduction in big game numbers which may cause a like reduction in the economy of the state of Colorado.
186. Comment: The DEIS states that a direct loss of 960 acres of habitat in any given year could be expected from oil and gas activity. This loss would not be significant to wildlife in the study area because less than .003 percent of the acres in the study area would be affected. (79, 86)
- Response: It is stated in Chapter 4 (Wildlife) that this is not a significant impact when taken by itself.
187. Comment: We feel the requirement to compensate for loss of crucial habitat is unjust. The BLM justifies the stipulation because competition among ungulates may occur as a result of a reduction in big game winter ranges, however, we feel the problem is overpopulation of ungulates that exceed the range carrying capacity. (79)
- Response: See response to Comment #61.
188. Comment: The DEIS implies that oil and gas activities would require the use of an entire winter range, thereby forcing elk to move to an adjacent winter range. Elk may move a short distance to avoid human activity, but the situation described by the BLM appears excessive and should be verified and documented in a study. (86)
- Response: See revised text.
189. Comment: Caves are critical habitat for both Federal Candidate and State listed Species of Special Concern (bats), as well as providing habitat for endemic species of invertebrates. An analysis of potential impacts from oil and gas leasing should be conducted and a special stipulation requiring No Surface Occupancy buffer zones established. (90)
- Response: We concur with the need to analyze the potential impacts from oil and gas exploration and development on cave habitat and associated fauna. Until this analysis is completed, it would be premature to impose a No Surface Occupancy lease stipulation. The method of protection, if any is necessary, should be derived through the analysis. At the present time, the BLM has a

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limited inventory of caves. Those that are known could be identified and appropriate mitigation applied, as well as protecting areas unsurveyed but thought to have the potential geologic characteristics necessary for cave formation. Cave resource values have been identified in the Deep Creek ACEC/SRMA/VRM Class I/Cave Resource Area. The existing and proposed No Surface Occupancy and No Subsurface Occupancy stipulations will protect known cave resource values.

190. Comment: Although the CDOW has identified public lands within the Kremmling Resource Area as crucial habitat for greater sandhill cranes, potential impacts from oil and gas leasing on this habitat is not addressed in Chapter 4 under this Resource Area analysis for cumulative impacts. (90)

Response: See revised text.

191. Comment: It is also unclear how measures such as "a field inspection by a qualified individual of every APD and seismic location" will mitigate for impacts to currently unknown raptor nests when a pad location can only be moved up to 200 meters and a 1/4 mile buffer zone around a nest would be required to protect it. (90)

Response: We would protect newly discovered resources to the maximum extent possible under the terms of the lease.

192. Comment: The most efficient way to handle the many small depletions from individual wells would be to make an estimate of total depletion for the four resource areas in the upper Colorado River Basin covered in the EIS. This estimate could be based on the Assumptions for the Potential of Development already presented in Appendix B. (96)

Response: See revised text.

193. Comment: The Fish and Wildlife Service believes that major causes for the decline of the Colorado squawfish, humpback chub, bonytail chub, and the recently proposed razorback sucker, include the effect of impoundments and water depletion from the Colorado River and its tributaries such as the San Juan. Since oil and gas drilling involves a depletion of water, we believe that any action made possible by your Oil and Gas Leasing EIS that causes a depletion of water from the upper Colorado River basin should prompt a "may effect" finding for the listed and proposed fishes and necessitate consultation and conference under the Endangered species Act. (96)

Response: See revised text.

194. Comment: page 4-7 Conclusions Conclusions reached in the summary section for Chapter 4 are not supported by the analyses and mitigation measures presented in the DEIS. (90)

Response: See revised text.

195. Comment: Define "these species" on Page 4-7. Where are the "crucial habitats where cumulative impacts may already be limiting production?" This information is not provided in the DEIS. (90)

Response: See revised text.

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196. Comment: On page 4-7, 5th paragraph, the first sentence, "important" should be changed to wildlife. This would avoid the confusion between important habitats and crucial habitats mentioned in the last sentence. (92)
- Response: See revised text.
197. Comment: The statement (pg. 4-8) "Some long term loss and irreversible and irretrievable commitments of wildlife resources would occur, but no significant losses in wildlife populations or habitat would be expected" is open to question. How much is "significant?" (97)
- Response: See definition of significant.
198. Comment: The first paragraph on page 4-10 fails to mention any anticipated adverse impacts associated with oil and gas exploration and development activities. (88)
- Response: We disagree. The first paragraph on page 4-10 of the DEIS covers minor erosional losses and mitigation of that loss. We consider even this minor erosion due to oil and gas operations to be sufficiently adverse to warrant mitigation.
199. Comment: Page 4-15. In the discussion of Environmental Consequences related to cultural resources, there is at least one apparent contradiction. Citing Nickens, et al. (1981), the document notes an increased potential for impacts to identified and unidentified sites. The very next paragraph suggests that major impacts to cultural resources are unlikely. We suggest that the document be expanded, with consideration of Grady (1984, Environmental Factors in Archaeological Site Locations, Colorado Bureau of Land Management Cultural Resource Series, No. 9, Northwest Colorado Prehistoric Context, Denver) to more clearly delineate the magnitude of potential impacts to both surface and subsurface sites. (91)
- Response: It is stated that increase impacts may occur but these will not be significant. No additional discussion or analysis is necessary.
200. Comment: Page 4-15. Visual impacts to NPS units could be reduced by developing a visual protection zone around roads at Dinosaur National Monument and the Hovenweep Cooperative Management Strategies area. (91)
- Response: The NSO stipulation for the Hovenweep National Monument Resource Protection Zone has been identified for this purpose.
201. Comment: Page 4-16. The narrative on paleontology is not sufficient to ensure the reader that paleontological resources are adequately protected. The document notes that "identified sites must either be proven to have no significant fossils." What constitutes an "identified site?" (91)
- Response: As defined by the Colorado Supplemental Manual 8270, an "identified site" is one that has been recorded, evaluated, and if appropriate, protected. There are also areas that contain many sites that have been identified as fossil bearing places. These formations will also be surveyed, as needed, and protected.

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202. Comment: Page 4-17 of the document discusses the construction of access roads to the locations of oil and gas development. The Bureau of Land Management should be aware that access permits from the Department of Highways are required for any new access point onto State highways. This information should be included in the Final EIS. (92)
- Response: We are aware of this requirement. The majority of the anticipated oil field access roads will access existing BLM roads. However, in the case of both county roads and state highways, operators are required to obtain all necessary access permits and to fulfill the obligations of those permits.
203. Comment: Page 4-24. Although the cumulative effects of wildcat wells are generally insignificant, do field developments have effects that may be significant in some areas, for example, visuals or wildlife habitat? If the fields are only a few wells, the effect would be small. However, a large field of 50 wells could be significant. (99)
- Response: Your assumptions are correct and are addressed on page 4-24 of the DEIS. However, we are not projecting field development of as much as 50 wells in any Planning Area. Field development is discussed on page 2-2 and 2-3 of the DEIS. The greatest field development anticipated is about 21 wells in Little Snake Resource Area (Table 2-2, DEIS).
204. Comment: The soils in AVF's tend to transmit groundwater rapidly. Any contaminated water from drilling operations will tend to enter water faster in this case. (77)
- Response: Drilling fluids are contained on location for the express purpose of separating them from fresh water. When drilling operations are located on alluvial or porous soils, drilling fluid pits are lined to prevent entry into groundwaters, and constructed so as to prevent mixing with surface water.
205. Comment: Road building in the soft and easily-erodible soils of alluvial valleys is one of the historical causes of arroyo initiation and propagation. If no roads exist in an AVF, then don't build a new one! (77)
- Response: Oil and gas roads are sited by specialists. Alluvial valley bottoms as well as vegetation, wildlife, slope elevation, and other conditions are all considered in the location of a road. In general, alluvial valleys are avoided due to the several potential problems that can arise from placement of roads in these areas.
206. Comment: Roads associated with the oil and gas industry should be included in the non-point source program. (124)
- Response: All non-point sources of pollution are covered in the program. That includes roads used by the oil and gas industry.
207. Comment: The EIS should discuss impact mitigation of the waste water. (123)
- Response: "Waste water" is handled in one of several ways depending on its make-up. Non-hazardous waste water is evaporated naturally from the drill-site pit prior to pit closure. Hazardous pit fluids are hauled to appropriate disposal sites. Generally, these are commercial hazardous waste disposal sites. A recent BLM Washington Office notice has been added to approved APDs and is added to this documents "Conditions of Approval for all Alternatives" (Appendix D, APDS, Notification, DEIS).

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208. Comment: Are there any plans for monitoring sediment loads, wildlife populations, etc., to determine the effects of oil and gas activities? (99)
- Response: The BLM monitors all resources for impacts from all types of development as budget and other workloads allow. BLM specialists also acquire information gathered by such agencies as the Colorado Division of Wildlife and U.S. Geological Survey (to name only two). Data gathered from all sources is analyzed to determine impacts from the various permitted activities on public lands.
209. Comment: Migration of methane into adjacent water sources is a very real threat as is the depletion of overlying aquifers. We believe that it is likely to occur and would have a significant effect on water quality. (97)
- Response: See revised text.
210. Comment: We note the document references several of the above listed streams but we were unable to identify the impacts that oil and gas developments would have on these streams and their outstandingly remarkable values. (91)
- Response: No impacts were identified.
211. Comment: The nature of the liquid wastes proposed for deep well disposal needed to be documented, as well as the characteristics of the formations being considered for this purpose. (88)
- Response: Deep well disposal is approved or denied by the Colorado Oil and Gas Conservation Commission under primacy of the Environmental Protection Agency. It would be inappropriate for this document to address authority not granted the BLM.
212. Comment: Additional information relative to the proposed method for handling and disposing of water waste fluids (page 4-11), and anticipated dynamics around the percolation of such fluids from proposed reserve pits is needed. (88)
- Response: See revised text.
213. Comment: We are unaware of any situation where seismic disrupts normal water aquifers or altered subsurface water flows which "result in reduced flows or even the loss of all water in existing spring or water wells." (79)
- Response: See revised text.
214. Comment: It is not possible to require that all waste water from the drilling be trucked away for disposal in these surface water sensitive environments? (77)
- Response: The vast majority of water used in drilling operations is evaporated prior to pit closure. Only in a small percentage of cases where toxic continents are used in the drilling fluids are the drilling muds trucked to disposal sites. Other methods, such as on-site neutralization or extraction, are also employed.
215. Comment: Disposal of toxic wastes was ignored and the impacts not discussed. (124)
- Response: Waste fluids are discussed under "WATER" in Chapter 4. The handling of wastes, including toxic wastes, is discussed in Appendices A and D.

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217. Comment: What about mitigation for the possibility of subsidence. (123)
- Response: All drilling programs are reviewed and approved/denied by a petroleum engineer. Part of that review is the analysis of the casing program. The integrity of the well construction and the fluid withdrawal rates determine subsidence. Both are analyzed and monitored to prevent subsidence. However, primarily because of the consolidated rock overlying reservoirs in Colorado, there are no subsidence problems associated with any BLM wells.
218. Comment: BLM needs to address the problem of companies that fracture 2 to 3 times the allowable pressures or beyond the intended zone. (123)
- Response: The "allowable" referenced is based on state requirement for water disposal well, not production formation fracturing operation. The purpose of the State requirement is to prevent the breakdown of water disposal formation by injection pressure. The purpose of a formation fracture operation is the opposite, i.e., to break (or reservoir). In addition to our requirements, the drilling company has a large financial inducement to stay within zone in that propagating fractures beyond the reservoir would be a waste of time and money. Such fractures would not help production and could hurt it. For that reason, fracture engineers monitor pressures carefully, and halt the fracture job at the first sign of falling pressure.
219. Comment: Dinosaur National Monument The document notes that areas adjacent to Dinosaur National Monument are rated as having low potential for development. Given that this rating is the lowest potential identified in the Little Snake Resource Area and given further the low number of exploratory wells projected in this rating area, closure of the areas adjacent to the park should have minimal impact on potential production of oil and gas from the Resource Area as a whole. The potential impacts to park resources and resource values far outweigh this low potential for oil and gas development. (91)
- Response: BLM is required by law to provide for multiple use of the federal estate, both mineral and surface. This Colorado Oil and Gas Leasing EIS provides for leasing and development of the oil and gas estate in an environmentally sound manner. Impacts of oil and gas development are analyzed in this document and mitigation identified which will reduce identified impacts to an acceptable level. There have been no impacts or justification identified which would support your suggested closure. A closure for reasons other than identified and substantiated impact to resources is beyond the scope of this document.
220. Comment: Many of these National Natural Landmarks (NNL) are located in or near potential lease areas. Because of their significance and because Federal Agencies are responsible for considering impacts to NNL under Section 102 (2) (c) of the National Environmental Policy Act, we would appreciate consideration for these resources. (91)
- Response: There will not be any impacts to these areas.
221. Comment: Significant paleontological materials that will be impacted should be collected, prepared, stored, and placed in an acceptable repository. Burial or similar actions are not acceptable "otherwise protected" actions. (91)
- Response: Scientifically important paleontological materials will be collected and curated as stated in the Colorado Supplemental Manual 8270, Paleontological Resource Management.

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222. Comment: The paleontology section concludes with the statement that "The unavoidable loss is insignificant in relationship to the widespread distribution of the resource." We suggest that this statement may be refuted by the significance of recent fossil finds in Dinosaur National Monument and elsewhere in western Colorado and eastern Utah. Some of the recent discoveries are classified a microfossils but, in spite of their small size, they have resulted in new prehistoric species and significant new gains in paleontological knowledge. (91)
- Response: It is Bureau policy (8270 Manual) that in areas of known sensitivity for significant fossils, a survey will be completed prior to development. If fossils are found to be scientifically important, they will be mitigated either through project redesign or excavation.
223. Comment: In light of recent discoveries and considering that existing surveys are far from complete, we recommend a survey of all areas that will be subjected to surface disturbance. The survey could identify and assess the significance of surface materials. In those formations known to bear significant fossils, it might also be wise to survey materials disturbed by subsurface operations. (91)
- Response: A survey of all areas may not be appropriate depending on the geological nature of the area. In some cases, there are very few fossil bearing areas and they would not be subject to a survey. However, in known fossil producing areas (Class I), a survey is required. In areas suspected of bearing paleontological materials, a survey will be recommended as per the Colorado Supplemental Manual 8270.
224. Comment: The Transportation issue has not been addressed in sufficient detail to analyze short and long-term impacts to BLM-managed lands. (90)
- Response: See revised text.
225. Comment: A coal company faces safety, production, and economic impacts if oil wells are drilled on their mining area. (82, 130)
- Response: See revised text.
226. Comment: Underground mines also are not exempt from problems created by wells. They will be faced with the same abandonment problems or leaving a large reserve of coal un-mined. This would be particularly difficult for a modern longwall operation to deal with a well. Moving a longwall set up to avoid a well is very expensive and may not be feasible at all. (82, 130)
- Response: See revised text.
227. Comment: If an oil and gas well is drilled in the path of our planned mining operations, numerous problems result. Under Colorado Mined Land Reclamation Division regulations (4.08.4(7)(b)), blasting cannot be conducted within 500 feet of a facility such as an oil or gas well or a pipeline unless a variance can be obtained. The federal office of Surface Mining regulations (30 CFR, 816.67(d) and 817.67 (d)) limit blasting in the area of facilities such as an oil or gas well or pipeline. (82, 130)
- Response: See revised text.

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228. Comment: Cumulative Impacts: Chapter 4 The Cumulative Impact section should be expanded upon. BLM has limited the scope of the EIS to cumulative impacts on BLM lands and to impacts associated with only oil and gas leasing. (90)
- Response: This section has been revised. The cumulative impacts cover all activities on lands within the respective Resource/Planning Area.
229. Comment: The evaluation in the DEIS of cumulative impacts of oil and gas activities in combination with other activities on these lands is inadequate. (78, 81, 91)
- Response: See revised text.
230. Comment: Does BLM's cumulative analysis exclude adjacent private and split-estate lands? (90)
- Response: The cumulative impacts do include private and split estate lands. See Chapter 4, Cumulative Impacts section.
231. Comment: It seems that prior to reaching a conclusion on "significance," an analysis of cumulative impacts for all land uses on major vegetative community types for both adjacent private, split-estate, and federal lands should be analyzed. With the information presented in the DEIS, there is no basis for this conclusion. (90)
- Response: See revised text.
232. Comment: The potential added impact from oil and gas leasing should be addressed for the alternatives and under the cumulative impacts section in Chapter 4. (90)
- Response: See revised text.
233. Comment: No issues relating to the impacts on opportunities to explore for and develop oil and gas which could result from surface management were addressed in the DEIS. (86)
- Response: The impacts to oil and gas development are discussed on page 4-22 of the DEIS.
234. Comment: On split estate this document does not address the problems of lambing and calving on private lands, yet wildlife is granted relief. (80)
- Response: According to BLM policy, a lease stipulation is not necessary for resource protection where a Timing Limitation is 60 days or less, or where you desire to relocate the proposed operation 200 meters or less. Such mitigation is within the definition of reasonable measures an Authorized Officer may deem necessary to protect other resource values or uses under the terms of the lease (specifically, section 6 of the standard lease form) and the regulations at 43 CFR 3101.1-2. This is a very clear demarcation between when a lease stipulation is required and when alternative mitigation can be equally effective.
- The BLM has afforded protection to lambing areas under Conditions of Approval in Appendix F (see page F-1 of the Draft EIS). These COAs will be attached to lease notices at the time of lease issuance. This same policy applies to wildlife mitigation where conflicts occur for less than 60 days, a COA is used; however, a stipulation is required for lease restrictions greater than 60 days.

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235. Comment: In Chapter 4, page 2, a paragraph on reclamation on split estate leaves the private landowner with little or no control over revegetation and water erosion from drilling pads. (80, 81, 107)
- Response: The private landowner is given the option to have the land reclaimed. BLM will enforce the revegetation and erosion control if requested.

Chapter 5 Comment

236. Comment: The records of coordination with the U.S. Fish and Wildlife Service under the Endangered Species Act and with the U.S. Army Corps of Engineers for potential impacts to riparian and wetlands under Section 404 of the Clean Water Act need to be included. (90)
- Response: These are included in Chapter 1, Relationship to Non-BLM Policies, Plans, and Programs.

Chapter 7 Comments

237. Comment: The definition of mitigation should also include avoiding and compensating which today are considered essential to the mitigation process. (92)
- Response: The definition of mitigation has been changed to include avoiding and compensating for resource losses.
238. Comment: Did the state of Colorado have input to BLM's state list of sensitive species? Where is this document available? (92)
- Response: The sensitive species should have indicated it listed only plant species, not animals.

Appendix A Comments

239. Comment: Appendix A description of seismic operations is out-dated and needs revision. (84, 85)
- Response: See revised text.
240. Comment: Appendix A appears to be generalized oil and gas operations and could be confused with the Proposed Action alternative. (99)
- Response: Appendix A, as revised for the FEIS, is an accurate representation of the Proposed Action.
241. Comment: Geological Exploration can be considered a "connected action" under NEPA and potential impacts to BLM resources should be analyzed under this EIS. (90)
- Response: See revised text.

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242. Comment: The description for this chapter needs to be contemplated with regard to the pending changes in the Notice of Intent (NOI) system. Those potential changes from the Washington office may cause this portion along with other areas of the document, to need rewriting. (84, 85)

Response: We are not aware of significant changes which are imminent. Additionally, the analysis and decisions in this document can be based only upon the policies, procedures, etc., in place at the time the document is prepared. We cannot anticipate the shape and impact of possible changes in policies, etc.

243. Comment: The DEIS states that "Five thousand to 15,000 gallons of water may be needed for mixing drilling mud, cleaning equipment, cooling engines, etc. A surface pipeline may be laid to a stream or a water well, or the water may be trucked to the site from ponds or streams in the area." As this statement follows the preceding paragraph which discusses construction of one well pad, it is assumed that this water use figure is for each well. (90)

Response: See revised text.

244. Comment: The Washington office is currently dealing with the explosives issue in a way that corrects the misunderstandings inherent in "loaded shot holes shall not be left unattended." Their language states: loaded shot holes shall not be left unsecured according to ATF techniques. Powder magazines should be stored and handled according to ATF standards and not in conflict with any other applicable federal, state, or local regulations. (85)

Response: See revised text.

245. Comment: Threatened, endangered and sensitive species: Is it not possible to argue that the whole resource area is potential habitat? We would suggest that a map showing those areas of concern be circulated so that operators may see potential concerns in advance. (85)

Response: See revised text.

246. Comment: E. Construction: Paragraph 5, "However . . . within 1/4 mile to springs, wells or impoundments. . ." Vibroseis is a safe, controllable energy source that is used in heavily populated downtown areas. To restrict that source from springs 1/4 miles is unnecessary. Studies have been done which show that 50 lbs. of explosives may be detonated within 250' of springs with no effect. Likewise, vibroseis operations need only limit themselves to such distances as allow the driver safe passage around the well or other physical barrier. (85)

Response: See revised text.

247. Comment: Because the industry regularly backfills and tamps holes before shooting, no geophysical operations today create "small craters." (86)

Response: See revised text.

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Appendix B Comments

248. Comment: Appendix B maps and other information provided by each resource area should be standardized. (86)
- Response: See revised Appendix.
249. Comment: According to the table, the LSRA could realize the greatest surface disturbance of all the planning areas evaluated. Development in prairie dog towns prior to their evaluation for black-footed ferret recovery could compromise potential reintroduction proposals. (96)
- Response: Because development will be highly dispersed, there will be no significant impact on black-footed ferret reintroduction efforts. A special lease notice concerning the potential for black-footed ferret reintroduction is contained in Appendix E.
250. Comment: Appendix B--Some of the data and maps are difficult to understand. Are they needed for the document? (99)
- Response: See revised text.
251. Comment: The figures throughout Appendix B need to be reexamined. It is inconsistent and confusing. Furthermore, the maps and data provided by each resource area should be standardized so they are all on the same scale, and are using the same definition of high, medium, low, and unknown potential. (95)
- Response: See revised text.
252. Comment: Appendix B contains assumptions for the Potential of Development which consist of average disturbances, projected number of wells, and total acres disturbed. The appendix is extremely confusing and requires extensive clarification. (86)
- Response: See revised text.
253. Comment: The narrative describing the potential for development in the GSRA indicates that 54 wells would be drilled in the area over the next 20 years. Using the information in Table B-1, one would calculate that an average of 34.7 acres would be disturbed per year and a total of 694 acres would be disturbed over 20 years. Yet, Table B-3 indicates that a total of 78.8 acres would be disturbed each year (25 acres would be reclaimed, leaving 53.8 acres per year), and Table B-4 indicates that 836 acres would be disturbed over 20 years. Such discrepancies must either be eliminated or fully explained. (86)
- Response: The figures in Table B-1 are an indication of the average surface disturbance associated with each projected well. Table B-1 gives no figures related to time.

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254. Comment: The information on Table B-3 does not coincide with that shown on Table B-4. According to the information displayed in Table B-3, approximately 180,164 acres could be disturbed over a 20-year period. Yet Table B-4 indicates a total of 20,219 acres would be disturbed over 20 years. The BLM should verify, correct if necessary, or explain in greater detail how these figures were derived. (86)
- Response: You are apparently incorrectly reading Table B-3 (DEIS). Table B-3 is designed to show the average number of acres which we anticipate being disturbed during any given one-year time period. This figure includes disturbance that may exist for all 20 years and that which may exist for only a few months. The purpose of Table B-4 is to show the total number of acres disturbed (productive and reclaimed) during the next 20 years.
255. Comment: According to Table B-4, these miscellaneous figures constitute the total additional disturbance expected over the life of the plan. This distinction must be made on Table B-1. (86)
- Response: We concur. The "Miscellaneous" column in Table B-1 refers to a total disturbance figure while the other columns refer to disturbance per well. The "Misc." has been dropped from Table B-1. The figure for Glenwood Springs, "Misc.," Table B-4 has been changed from "0" to "100."

Appendix D Comments

256. Comment: Misc. How many of these areas exist? Why is there a 24-hour restriction? Is there no happy medium which allows both users access during different parts of the day? There must be a reasonable alternative. (85)
- Response: See revised text.
257. Comment: Appendix D is not accurate and needs to be revised. (84, 85)
- Response: See revised text.
258. Comment: Appendix D, Geophysical Operations, requires operators to perform Class III cultural resource inventories on all portions of seismic lines which cross BLM surface. This far exceeds the requirements of Section 106 of the National Historic Preservation Act. A Class III inventory is required only if there is a strong indication that sites exist which would be eligible for inclusion in the National Register of Historic Places (84, 85, 86)
- Response: A Class III cultural resources inventory is required by Bureau policy and the National Historic Preservation Act whenever a "federal undertaking" occurs. Section 106 requires consultation with the State Historic Preservation Officer and in that process, a Class III inventory may be required. The matter of site indication is irrelevant under Section 106's "federal undertaking" provision.
259. Comment: Explosives: the restriction that "loaded shotholes not be left unattended" is somewhat confusing. The reason is that there may be short intervals between when the shothole was loaded and when it is detonated that the hole is unattended. (94)
- Response: See revised text.

CHAPTER FIVE

260. Comment: Production: One requirement in the section states that rock surfacing will be required for all-weather operations. This requirement is not necessary in all situations. (94)
- Response: As stated in the Introduction to Appendix D, "COAs are not added to applications if they are unnecessary (do not apply to the case in question) . . ." The COAs listed in Appendices D, F, H, and I are intended to show the reader examples of mitigative measures applied to approved applications.
261. Comment: Another area of concern is the requirement that appropriate noise mitigation will be employed if the well is located within 2,500 feet of a residence. A half mile radius to employ this rule is excessive. There are a multitude of conditions that could affect noise on a given residence. (94)
- Response: The concern is noted. In cases where operations are to be located within 2,500 feet of a residence, all factors are analyzed prior to APD approval. Mitigation of the impact is based on that analysis.
262. Comment: Resources (other than oil and gas) - A paragraph states that water wells drilled to provide water will be offered to the BLM after use and that water rights will be held by the BLM. It is important that the statement be added that BLM also assume all legal responsibility for the well after assuming ownership. This is an important aspect that must be documented for future records maintained by the state of Colorado. (94)
- Response: See revised text.
263. Comment: Cultural Resources: within this section there are numerous references to a 500' setback of seismic activities from cultural resources. In reviewing the restriction, there appears to be no flexibility provided in modifying this restriction. (94)
- Response: It is Bureau policy that flexibility is part of the APD and/or seismic process. The 500-foot setback rule generally pertains to sensitive cultural resources such as standing structures. It is applied at the discretion of the field manager who may waive this rule if cultural resources are not endangered by seismic activities.
264. Comment: The official title of Area Supervisors is now Area Wildlife Managers. (92)
- Response: Concur.
265. Comment: T&E animal species should also be included along with the discussion of T&E plants. (92)
- Response: See revised text.
266. Comment: Have raptor and sandhill crane nests been inventoried, and will there be an opportunity to include such information after an APD or other action is granted: Nest sites are dynamic and may require protection after-the-fact of issuance of the necessary permits. (92)
- Response: Existing inventory information is used as available and additional information is collected as time and funds permit. Protection measures will be taken to the extent that the valid existing lease rights are not violated.

CONSULTATION AND COORDINATION

267. Comment: We recommend that the Conditions of Approval regarding pipelines be amended to include requirements for automatic shut-off valves, double wall pipe, and response teams in each instance a pipeline crosses the Yampa River or any other stream where spills have the potential to impact endangered fishes. (91)

Response: Your recommendation will be reviewed for possible inclusion in lease operations, however, it would be pointed out that pipelines crossing such major drainages as the Yampa River are not within the scope of this document. Those lease operations covered by this EIS contain provisions for protection of streams and there is in place a notification and response process for handling spills.

Appendix E Comments

268. Comment: Why did Appendix E fail to include avoidance stipulations for the Anasazi Cultural Multiple Use ACEC? (83)

Response: NSO designations have been placed on specific locations that need special protection. We cannot prohibit oil and gas exploration and development in the ACEC area because the existing leases are held by production and the area is under the McElmo Dome Production Unit.

269. Comment: Appendix E identifies lease stipulations which will be considered for application in accordance with the Proposed Action. In many cases, exception criteria are identified; however, in some cases they are not. While it is stated that even where no exception criterion is identified exceptions will be considered on a case-by-case basis, this statement should be more prominently displayed in the appendix to avoid possible future conflicts. (86)

Response: See revised text.

270. Comment: Appendix E. I. No Surface Occupancy Stipulations: two specific areas of concern exist with this section. One deal with the restriction regarding raptor nests. The stipulation states that a 1/4-mile setback will be required for certain species of raptors. Exception criterion is listed which includes evidence of permanent abandonment. (94)

Response: See revised text.

271. Comment: Appendix E--How are overlapping stipulations managed? Presumably, the most restrictive stipulation will be applied. The possibility and desirability of standardized leases between the BLM and FS to eliminate inconsistencies across boundaries has been discussed. The Montana BLM stipulations appear to be a good start, and we should pursue this opportunity in the near future. (99)

Response: All appropriate stipulations are attached to the lease as required even if they overlap. The reason for this policy is that some restrictions may be waived, excepted or modified at the time of field operation. In which case, a less restrictive measure may still apply even though a more restrictive one was excepted. We concur with stipulation standardization. Colorado BLM, as well as Region 2 Forest Service, use the Rocky Mountain Regional Coordinating Committee Uniform Format (see revised text, Appendix E).

CHAPTER FIVE

272. Comment: No Surface Occupancy. Until black-footed ferret recovery potential has been evaluated in each planning area, and reintroduction decision documents are in place, we believe all prairie dog towns in each planning area should be designated NSO. According to the peregrine falcon recovery plan for the Rocky Mountain Southwest Populations, recovery task number 1221 asks that permanent disturbances be prohibited within one mile of falcon nesting cliffs. We believe the NSO stipulation should adopt this recommendation. (96)

Response: The draft "Guidelines for oil and gas activities in prairie dog ecosystems managed for black-footed ferret recovery," Feb. 1990, prepared by U.S. Fish and Wildlife Service, Denver, did not recommend or even suggest the need for a NSO within the general guidelines.

273. Comment: Usually a 1/2 mile radius from the nests of these raptor species is necessary for their protection. This distance should be consistent with that given on page E-6. For T&E species, recovery plan guidelines should be conditions of the lease rather than BLM general stipulations. (92)

Response: All raptor nests are protected from destruction through a uniform NSO stipulation of a one-eighth mile radius of the nest site. The one-half mile radius is a Timing Limitation to protect the nest from human-associated activities from February 1 to August 15. All T&E species are protected by the Endangered Species Act with a notice to this effect in all oil and gas lease offers.

274. Comment: Please discuss your criteria for permanent abandonment of nests. (92)

Response: The permanent nest abandonment exception criterion has been reworded to: during years when a nest site is unoccupied or unoccupied by or after May 15, the seasonal limitation may be suspended.

275. Comment: A two-mile radius from the lek is necessary to protect grouse breeding habitat as explained on pages 3-24 and 4-4. (92)

Response: See revised text.

276. Comment: A stipulation affording protection to riparian and wetland areas should be included. Why are only wetlands protected by a stipulation? (90)

Response: See Appendix D.

277. Comment: CDOW's Garfield Creek State Wildlife Area should be covered under a No Surface Occupancy stipulation because of its importance as an ecological unit. (92)

Response: This was an oversight and is corrected in the Final EIS. In addition, we feel that the CDOW's Toner Creek Property should also be protected in similar fashion and is added to the final EIS.

CONSULTATION AND COORDINATION

278. Comment: An exception criterion identified for several NSO stipulations in the GSRa on page E-3 would require operators to "eliminate" drill rig and other equipment noise. This requirement is excessive and virtually impossible to achieve. We recommend the word "eliminate" be replaced with the word "reduce," which is more reasonable (86, 94)
- Response: Drill rig and other equipment noise could not be eliminated at the source, but would be substantially unnoticeable in the noise sensitive areas. Sensitive areas would be identified at the time a specific drilling/operation site is proposed. If no sensitive areas are identified, the exception would be granted. If a sensitive area is identified, relocation or other mitigation to reduce noise would be required. If the noise impact cannot be eliminated, the exception would not be granted to protect the sensitive areas.
279. Comment: We support the No Surface Occupancy stipulation for the Hovenweep Cooperative Management Strategy area. This stipulation should also include the Goodman Point and Cutthroat Castle resource protection zone areas. (91)
- Response: The NSO stipulation proposed for Goodman Canyon and the Goodman Point Buffer Zones includes the federal mineral estate lands surrounding Goodman Point Ruin. A NSO designation on the lands surrounding Cutthroat Castle was inadvertently overlooked. A buffer zone of 320 acres will be added.
280. Comment: The radius for lek/nesting habitat for grouse should be two miles. (92)
- Response: See revised text.
281. Comment: Bald eagle nesting activity is nearly year-round in some areas with resident birds. Special stipulations may be needed in the areas. (92)
- Response: Bald eagle nesting habitat is protected from human-associated activities from December 15 to June 15. This Timing Limitation measure restricts human activity one month prior to nesting selection for courtship and nest building activities and one month after eggs are hatched.
282. Comment: Timing Limitation stipulations presented on pages E-6 and E-7 should be revised to include the word "known" before the words "Winter Habitat, Crucial Winter Range, etc." (90)
- Response: If the areas are not known, they cannot be delineated.
283. Comment: The DEIS states that "The CSU stipulation is less restrictive than the NSO or TL stipulations, which prohibit all occupancy and use on all portions of a lease for all or portions of a year." This statement is not true as the TL stipulation allows for operation and maintenance within critical time periods. (90)
- Response: See revised text.

CHAPTER FIVE

284. Comment: Both the LSRA and GSRA would impose a Controlled Surface Use stipulation for the protection of fragile soils. Several performance objectives are identified which are designed to ensure soil productivity. This special stipulation is not necessary because fragile soils are adequately protected by standard terms and conditions of the lease. There is no need to overburden the lessee with excessive restrictions. (86)
- Response: Fragile soils are not adequately protected under the standard terms and conditions of the lease. Once a lease is granted, the lessee has a right to develop that lease and cannot be forced to relocate operations more than 200 meters within the lease to avoid fragile areas. If the entire lease were located on fragile soils, fragile soils would unavoidably be disturbed. The Controlled Surface Use stipulation is designed to "warn" the lessee prior to the time of lease issuance that fragile soils exist on the lease and may require special measures for protection over and above measures normally taken in accordance with the standard terms and conditions. If the lessee cannot meet the Controlled Surface Use stipulations, no surface disturbance will be allowed on the site. The characteristics of fragile soils and why they require these special Controlled Surface Use stipulations are explained in Chapters 3 and 4.
285. Comment: The Controlled Surface Use stipulations outlined by the GSRA should be applied to all Resource Areas. (92)
- Response: See revised text.

Appendix F Comment

286. Comment: In Appendix F, it is stated that one of the Conditions of Approval for the GSRA and LSRA in fragile soil areas is: Before reserve pits, production pits, or emergency pits can be reclaimed, all residue will be removed and trucked off-site to an approval disposal site." Other alternatives must be considered. (95)
- Response: See revised text.

Appendix L Comments

287. Comment: A threatened and endangered species animal list needs to be added here. There should be a similar appendix for the Kremmling and Northeast Planning Areas. (96)
- Response: Chapter 3 has a table showing T&E species occurrence by Resource Area.
288. Comment: Table L-1 should be updated to include the results of the 1987-1989 surveys conducted by the Colorado Natural Areas Program near Dinosaur National Monument. A copy of the summary table from that research is enclosed. (91)
- Response: The list will be updated as more current information becomes available. We are currently awaiting receipt of a new list from the Colorado Natural Areas Program.

CHAPTER SIX

LIST OF PREPARERS

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LIST OF PREPARERS

The following list displays the various individuals who have contributed to this EIS, their home office, and field of expertise.

Core Team

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CHAPTER SIX

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CHAPTER SEVEN

ACRONYMS/ GLOSSARY

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ACRONYMS

ACEC	Area of Critical Environmental Concern	NRHP	National Register of Historic Places
AIRFA	American Indian Religious Freedom Act	NSO	No Surface Occupancy
APD	Application for Permit to Drill	NTL	Notice to Lessees
AQRV	Air Quality Related Values	NWCCOG	Northwest Colorado Council of Governments
AUM	Animal Unit Month	NWPS	National Wilderness Preservation System
BEA	Bureau of Economic Analysis	OHV	Off-Highway Vehicles
BLM	Bureau of Land Management	ONA	Outstanding Natural Area
BO	Barrels of oil	PA	Plan Amendment
CDOW	Colorado Division of Wildlife	PAS	Planning and Assessment System
CFR	Code of Federal Regulations	POD	Potential of Development
CEQ	Council on Environmental Quality	PSD	Prevention of Significant Deterioration
CNAP	Colorado Natural Areas Program	PV	Prospectively valuable
COA	Condition of Approval	R&PP	Recreation and Public Purposes Act
COGCC	Colorado Oil and Gas Conservation Commission	RFD	Reasonably Foreseeable Development
CSU	Controlled Surface Use	RMP	Resource Management Plan
DAP	Dolores Archaeological Project	RNA	Research Natural Area
DAU	Data Analysis Unit	ROW	Right-of-Way
DEIS	Draft Environmental Impact Statement	SCS	Soil Conservation Service
DOD	Department of Defense	SJRA	San Juan Resource Area
DOE	Department of Energy	SJ/SMPA	San Juan/San Miguel Planning Area
EA	Environmental Assessment	SRMA	Special Recreation Management Area
EIS	Environmental Impact Statement	SSF	Soil Surface Factor
EPA	Environmental Protection Agency	T&E	Threatened and Endangered
ERMA	Extensive Recreation Management Area	TDS	Total Dissolved Solids
ESA	Endangered Species Act	TSP	Total Suspended Particulates
FLPMA	Federal Land Policy and Management Act	USFS	U.S. Forest Service
FOOGLRA	Federal Onshore Oil and Gas Leasing Act of 1987	USFWS	U.S. Fish and Wildlife Service
GSRA	Glenwood Springs Resource Area	USGS	U.S. Geological Survey
IHICS	Integrated Habitat Inventory and Classification System	USLE	Universal Soil Loss Equation
KRA	Kremmling Resource Area	VRM	Visual Resource Management
KRCRA	Known Recoverable Coal Resource Area	WRIS	Wildlife Resource Information System
LSRA	Little Snake Resource Area	WSA	Wilderness Study Area
LSRMP	Little Snake Resource Management Plan		
MCF	1,000 cubic feet		
NEPA	National Environmental Policy Act		
NERA	Northeast Resource Area		
NOI	Notice of Intent		
NPA	Northeast Planning Area		

CHAPTER SEVEN

GLOSSARY

ABANDONMENT. Abandonment is plugging a well, removal of installations, and termination of operations for production from a well. Conclusively, abandoned unpatented oil placer mining claims are subject to conversion into a noncompetitive oil and gas lease pursuant to the Federal Oil and Gas Royalty Management Act of 1982 (30 U.S.C. 188(f)).

AIR QUALITY CLASSES. Classifications established under the Prevention of Significant Deterioration portion of the Clean Air Act which limits the amount of air pollution considered significant within an area. Class I applies to areas where almost any change in air quality would be significant; Class II applies to areas where the deterioration normally accompanying moderate well-controlled growth would be permitted; and Class III applies to areas where industrial deterioration would generally be allowed.

ALLUVIAL SOIL. A soil developing from recently deposited alluvium and exhibiting essentially no horizon development or modification of the recently deposited materials.

ALLUVIUM. Clay, silt, sand, gravel, or other rock materials transported by flowing water. Deposited in comparatively recent geologic time as sorted or semi-sorted sediment in riverbeds, estuaries, floodplains, lakes and shores, and in fans at the base of mountain slopes.

ANIMAL UNIT MONTH (AUM). The amount of forage necessary to sustain one cow and one calf or its equivalent for one month.

ANTICLINE. A fold, generally convex upward, whose core contains the stratigraphically older rocks.

APPLICATION. A written request, petition, or offer to lease lands for the purpose of oil and gas exploration and/or the right of extraction.

AQUATIC. Living or growing in or on the water.

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC). An area established through the planning process as provided in

FLPMA where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values; or to fish and wildlife resources or other natural systems or processes; or to protect life and afford safety from natural hazards.

BASIN. (a) A depressed area with no surface outlet. (b) A low in the Earth's crust, of tectonic origin, in which the sediments have accumulated.

BIG GAME. Larger species of wildlife that are hunted, such as elk, deer, bighorn sheep, and pronghorn antelope.

CANDIDATE SPECIES. Any species not yet officially listed but which are undergoing a status review or are proposed for listing according to *Federal Register* notices published by the Secretary of the Interior or the Secretary of Commerce.

CONDITION OF APPROVAL (COA). Conditions or provisions (requirements) under which an Application for a Permit to Drill or a Sundry Notice is approved.

CONTROLLED SURFACE USE (CSU). Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify the lease rights. CSU is used for operating guidance, not as a substitute for the NSO or Timing stipulations.

CRUCIAL HABITAT. A biological feature, that if lost, would adversely affect the species.

CULTURAL RESOURCES. Those fragile and non-renewable remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in human events.

CULTURAL RESOURCES INVENTORY CLASSES.

CLASS I. An existing data survey. This is an inventory of a study area to (1) provide a narrative overview of cultural resources by using existing information, and (2) compile existing cultural resources site record data on which to base the development of the BLM's site record system.

CLASS II. A sampling field inventory designed to locate, from surface and exposed profile indications, all cultural resource sites within a portion of an area so that an estimate can be made of the cultural resources for the entire area.

CLASS III. An intensive field inventory designed to locate, from surface and exposed profile indications, all cultural resource sites in an area. Upon its completion, no further cultural resources inventory work is normally needed.

CUMULATIVE IMPACTS. The collective and aggregate impacts of all actions affecting a particular resource.

DIASTROPHISM. A general term for all movement of the crust produced by tectonic processes, including the formation of ocean basins, continents, plateaus, and mountain ranges.

DIRECTIONAL DRILLING. Drilling borehole wherein course of hole is planned before drilling. Such holes are usually drilled with rotary equipment at an angle to the vertical and are useful in avoiding obstacles or in reaching side areas or mineral estate beneath restricted surface.

DIVERSITY. The relative abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

EASEMENT. Right afforded a person or agency to make limited use of another's real property for access or other purposes.

ENDANGERED SPECIES. Any species which is in danger of extinction throughout all or a significant portion of its range.

ENVIRONMENTAL ASSESSMENT (EA). A concise public document prepared to provide sufficient evidence and analysis for

determining whether to prepare an environmental impact statement or a finding of no significant impact. It includes a brief discussion of the need for the proposal, alternatives considered, environmental impact of the proposed action and alternatives, and a list of agencies and individuals consulted.

ENVIRONMENTAL IMPACT STATEMENT (EIS). A formal public document prepared to analyze the impacts on the environment of a proposed project or action and released for comment and review. An EIS must meet the requirements of NEPA, CEQ guidelines, and directives of the agency responsible for the proposed project or action.

EXCEPTION. Case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria applies.

FACIES. The aspect, appearance, and characteristics of a rock unit, usually reflecting the conditions of its origin; especially as differentiating the unit from adjacent or associated units.

FAULT. A fracture or zone of fractures along which there has been displacement of the sides relative to one another parallel to the fracture.

FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976 (FLPMA). Public Law 94-579 signed by the President on October 21, 1976. Establishes public land policy for management of lands administered by the Bureau of Land Management. FLPMA specifies several key directions for the Bureau, notably (1) management on the basis of multiple-use and sustained yield, (2) land use plans prepared to guide management actions, (3) public lands for the protection, development, and enhancement of resources, (4) public lands retained in federal ownership, and (5) public participation utilized in reaching management decisions.

FOLD. A curve or bend of a planar structure such as rock strata, bedding planes, foliation, or cleavage. A fold is usually a product of deformation, although its definition is descriptive and not of genetic and may include primary structures.

FORAGE. All browse and herbaceous foods that are available to grazing animals.

CHAPTER SEVEN

FOREST MANAGEMENT. The application of business methods and technical forestry principles to the operation of a forest property.

FORMATION. A body of rock identifies by lithic characteristics and stratigraphic position; it is prevalingly but not necessarily tabular, and is mappable at the Earth's surface or traceable in the subsurface (NACSN, 1983, Art. 24).

FOSSIL. The remains or traces of an organisms or assemblage of organisms which have been preserved by natural processes in the earth's crust exclusive of organisms which have been buried since the beginning of historic time. Minerals, such as soil and gas, coal, oil shale, bitumen, lignite, asphaltum, and tar sands, phosphate, limestone, diatomaceous earth, uranium and vanadium, while they may be of biologic origin, are not here considered "fossils." Fossils of scientific value may occur within or in association with such materials.

FRAGILE SOIL. A soil that is especially vulnerable to erosion or deterioration due to its physical characteristics and/or location. Disturbance to the surface or the vegetative cover can initiate a rapid cycle of loss and destruction of the soil material, structure, and ability to sustain a biotic community.

GEOPHYSICS. Study of the Earth by quantitative physical methods.

GRANITE WASH TRAP. Granite wash is a sandstone formed by weathered granite basement rock. Granite is composed of coarse, sand-size crystals that weather to from a sandstone covering the flanks of buried granite mountains and hills. Source rocks occur deeper, along the flanks.

GRAZING SYSTEM. Scheduled grazing use and non-use of an allotment to reach identified goals or objectives by improving the quality and quantity of vegetation.

GROUND COVER. The area of ground surface occupied by the stem(s) of a range plant, as contrasted with the full spread of its herbage or foliage, generally measured at one inch above soil level.

GROWING SEASON. Generally, the period of the year during which the temperature of vegetation remains sufficiently high to allow plant growth.

HABITAT. A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

HYDROCARBON. Any organic compound, gaseous, liquid, or solid, consisting solely of carbon and hydrogen.

IGNEOUS. Said of a rock or mineral that solidified from molten or partly molten material.

IMPACT. The effect, influence, alteration, or imprint caused by an action.

INTERMONTAINE. Situated between or surrounded by mountains, mountain ranges, or mountainous regions.

INVERTEBRATE. An animal lacking a backbone or spinal column.

KNOWN GEOLOGIC STRUCTURES (KGS). A trap in which an accumulation of oil and gas has been discovered by drilling and which is determined to be productive. Its limits include all acreage that is presumptively productive (43 CFR 3100.0-5(a)).

LAND TREATMENT. All methods of artificial range improvement and soil stabilization such as reseeding, brush control (chemical and mechanical), pitting, furrowing, water spreading, etc.

LEASABLE MINERAL. Oil, gas, sodium, potassium, phosphate, coal, oil shale, tar sands, and asphaltic materials.

LEASE. A contract in legal form that provides for the right to develop and produce oil and gas resources for a specific period of time under certain agreed-upon terms and conditions.

LEASE NOTICE. Provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. A Lease Notice also addresses special items the lessee would consider when planning operations, but does not impose new or additional restrictions.

LEASE STIPULATIONS. Additional specific terms and conditions that change the manner in which operation may be conducted on a lease, or modify the lease rights granted.

LEASABLE MINERALS. Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920. They include coal, phosphate, asphalt, sulphur, potassium and sodium minerals, and oil and gas. Geothermal resources are also leasable under the Geothermal Steam Act of 1970.

LOCATABLE MINERALS. Minerals or materials subject to claim and development under the Mining Law of 1872, as amended. Generally includes metallic minerals such as gold and silver, and other materials not subject to lease or sale (some bentonites, limestone, talc, some zeolites, etc.).

LOCATION. Perfecting the right to a mining claim by discovery of a valuable mineral, monumenting the corners, completing discovery work, posting a notice of location, and recording the claim.

LONG-TERM. Long-term impacts would occur over a 20-year period.

MINERAL ENTRY. Claiming public lands (administered by the BLM) under the Mining Law of 1872 for the purpose of exploiting minerals. May also refer to mineral exploration and development under the mineral leasing laws and the Material Sale Act of 1947.

MINERAL ESTATE (MINERAL RIGHTS). The ownership of minerals, including rights necessary for access, exploration, development, mining, ore dressing, and transportation operations.

MINERAL MATERIALS. Common varieties of sand, building stone, gravel, clay, moss rock, etc., obtainable under the Minerals Act of 1947, as amended.

MINING LAW OF 1872. Provides for claiming and gaining title to locatable minerals on public lands. Also referred to as the "General Mining Laws" or "Mining Laws."

MITIGATION. Alleviation or lessening of possible adverse effects on a resource by applying appropriate protective measures. Adverse effects can be rectified by either repairing, rehabilitating, or restoring affected environment and through compensation of the adverse effects by replacing or providing substitute resources or environments.

MODIFICATION. Fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A modification may, therefore, include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria applied.

MONOCLINE. A geologic structure in which the strata are all inclined in the same direction at a uniform angle of dip.

MULTIPLE-USE. Management of the various surface and subsurface resources so that they are jointly utilized in the manner that will best meet the present and future needs of the public, without permanent impairment of the productivity of the land or the quality of the environment.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA). Public Law 91-190. Establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

NATIONAL REGISTER OF HISTORIC PLACES (NATIONAL REGISTER, NRHP). A listing of architectural, historical, archaeological, and cultural sites of local, state, or national significance, established by the Historic Preservation Act of 1966 and maintained by the National Park Service.

NO SURFACE DISTURBANCE. Defined on a case-by-case basis when the activity plan for an area is developed. In general, an activity would be allowed so long as it does not interfere with the management objectives of the area.

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NO SURFACE OCCUPANCY (NSO). A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the lease surface in order to protect special values or uses. Lessees may exploit the oil and gas or geothermal resources under leases restricted by this stipulation through use of directional drilling from sites outside the no surface occupancy area.

NOTICE TO LESSEES (NTL). A written notice issued by the Authorized Officer. These notices implement regulation and operating orders, and serve as instructions on specific item(s) of importance within a State, District, or Area.

OFF-HIGHWAY VEHICLE (OHV). Any motorized vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain.

OFF-ROAD VEHICLE DESIGNATIONS.

CLOSED. Designated areas and trails where the use of off-road vehicles is permanently or temporarily prohibited. Emergency use of vehicles is allowed.

LIMITED. Designated areas and trails where the use of off-road vehicles is subject to restrictions such as limiting the number or types of vehicles allowed, dates and times of use (seasonal restrictions), limiting use to existing roads and trails, or limiting use to designated roads and trails. Under the designated roads and trails designation, use would be allowed only on roads and trails that are signed for use. Combinations of restrictions, such as limiting use to certain types of vehicles during certain times of the year, are possible.

OPEN. Designated areas and trails where off-road vehicles may be operated (subject to operating regulations and vehicle standards set forth in BLM Manuals 8341 and 8343).

ONLAP. An overlap characterized by the regular and progressive pinching out, toward the margins or shores of a depositional basin, of the sedimentary units within a conformable sequence of rocks, in which the boundary of each unit is transgressed by the next overlying unit and each unit in turn terminates farther from the point of reference.

ONLAP SANDS TRAP. Onlap sands are beach sands that were deposited on an unconformity surface as sea level rose. Numerous buttress sand can occur along a single unconformity and each can form a pool.

OVERSTORY. That portion of a plant community consisting of the taller plants on the site; the forest or woodland canopy.

PALEONTOLOGICAL RESOURCE. A site containing non-human life of past geological periods, usually in the form of fossil remains.

PATENT. A grant made to an individual or group conveying fee simple title to selected public lands.

PATENTED CLAIM. A claim on which title has passed from the federal government to the mining claimant under the Mining Law of 1872.

PLANNING AREA. The geographical area for which land use and resource management plans are developed and maintained.

PRIMITIVE. Areas that are almost completely free of management controls lying more than three miles from the nearest point of motor vehicle access, unmodified landscapes and little evidence of other people.

PUBLIC LAND. Any land and interest in land (outside of Alaska) owned by the United States and administered by the Secretary of the Interior through the Bureau of Land Management (BLM).

RAPTOR. Bird of prey with sharp talons and strongly curved beaks, e.g., hawks, owls, vultures, eagles.

RECLAMATION. Returning disturbed lands to a form and productivity that will be ecologically balanced and in conformity with a predetermined land management plan.

RECREATION AND PUBLIC PURPOSES ACT (R&PP). This Act authorizes the Secretary of the Interior to lease or convey public lands for recreational and public purposes under specified conditions to states or their political subdivisions, and to nonprofit corporations and associations.

RESOURCE AREA. A geographic portion of a BLM District that is the smallest administrative subdivision in the BLM.

RESOURCE MANAGEMENT PLAN (RMP). A land use plan that establishes land use allocations, multiple-use guidelines, and management objectives for a given planning area. The RMP planning system has been used by the BLM since about 1980.

RIPARIAN. Riparian areas are a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Normally describes plants of all types that grow rooted in the water table or subsaturation zone of streams, ponds, and springs.

RIPARIAN/AQUATIC SYSTEM. Interacting system between aquatic and terrestrial situations. Identified by a stream channel and distinctive vegetation that requires or tolerates free or unbound water.

RIPARIAN ZONE. An area encompassing riparian and adjacent vegetation.

ROADLESS. Refers to the absence of roads that have been constructed and maintained by mechanical means to ensure regular and continuous use.

ROADS. Vehicle routes which have been improved and maintained by mechanical means to ensure relatively regular and continuous use. (A way maintained strictly by the passage of vehicles does not constitute a road.)

SALINITY. Refers to the solids such as sodium chloride (table salt) and alkali metals that are dissolved in water. Often in non-saltwater areas, total dissolved solids is used as an equivalent.

SCOPING PROCESS. An early and open public participation process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.

SEDIMENT YIELD. The amount of sediment produced in a watershed, expressed as tons, acre-feet, or cubic yards of sediment per unit of drainage area per year.

SEMI-PRIMITIVE. Areas that have very few management controls lying between 1/2 mile and three miles from the nearest point of motor vehicle access, excepting four-wheel drive roads and trails, with mostly natural landscapes and some evidences of other people.

SHEET EROSION. The removal of a fairly uniform layer of soil from the land surface by runoff water.

SHORT-TIME. In this document, refers to the 10- to 12-year life of the plan. Short-term impacts would occur within that time period.

SHUT-IN. An oil or gas well that is capable of production but is temporarily not producing.

SIGNIFICANT. An action that is analyzed in the context of the proposed action and the severity of the effects either beneficial or adverse. The degree of significant is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance exists which the effects on the quality of the human environment are likely to be highly controversial.

SPECIAL RECREATION MANAGEMENT AREA (SRMA). An area that possesses outstanding recreation resources or where recreation use causes significant user conflicts, visitor safety problems, or resource damage.

SPLIT ESTATE. Lands where the owner of the mineral rights and the surface owner are not the same party in interest. The most common split estate is Federal ownership of mineral rights and other interest ownership of the surface. Where such a condition occurs, the Federal Government can lease the oil and gas rights without surface owner consent.

STIPULATION. A provision that modifies standard lease rights and is attached to and made a part of the lease.

STREAM BANK (and CHANNEL) EROSION. The removal, transport, deposition, recutting, and bed load movement of material in streams by concentrated water flows.

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STUDY AREA. Refers to all the Resource Areas and Planning Areas covered in this EIS collectively.

SUITABILITY. As used in the Wilderness Act and in the Federal Land Policy and Management Act refers to a recommendation by the Secretary of the Interior or the Secretary of Agriculture that certain federal lands satisfy the definition of wilderness in the Wilderness Act and have been found appropriate for designation as wilderness on the basis of an analysis of the existing and potential uses of the land.

SUNDRY NOTICE. Standard form to notify or approve well operations subsequent to Application for Permit to Drill, in accordance with BLM regulations.

SUPPLEMENTAL VALUES. Resources associated with wilderness which contribute to the quality of wilderness areas.

SURFACE MANAGEMENT AGENCY. Any agency outside of the Department of the Interior with jurisdiction over the surface overlying federally owned minerals.

SUSTAINED YIELD. The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple-use.

SYNCLINE. A fold of which the core contains the stratigraphically younger rocks; it is generally concave upward.

TECTONICS. A branch of geology dealing with the broad architecture of the outer part of the Earth, that is the regional assembling of structural or deformational features, a study of their mutual relations, origin, and historical evolution.

TERRESTRIAL. Living or growing in or on the land.

THREATENED SPECIES. Any species or a significant population of that species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

THRUST FAULT. A fault with a dip of 45 degrees or less over much of its extent, on which the hanging wall (overlying side) appears to have moved upward relative to the footwall (underlying side).

TIMBER. Standing trees, downed trees, or logs which are capable of being measured in board feet.

TIMING LIMITATION (SEASONAL RESTRICTION). Prohibits surface use during specified time periods to protect identified resource values. The stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient.

TOTAL DISSOLVED SOLIDS (TDS). Salt, or an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts.

TRAP. Any barrier to the upward movement of oil or gas, allowing either or both to accumulate. A trap includes a reservoir rock and an overlying or updip impermeable roof rock; the contact between these is concave as viewed from below. See also: definitions of types of stratigraphic traps below.

TRESPASS. Any unauthorized use of public land.

UNCONFORMITY. A substantial break or gap in the geologic record where a rock unit is overlain by another that is not next in stratigraphic succession, such as an interruption in the continuity of a depositional sequence of sedimentary rocks or a break between eroded igneous rocks and younger sedimentary strata.

UNDERSTORY. That portion of a plant community growing underneath the taller plants on the site.

UNIVERSAL SOIL LOSS EQUATION (USLE). A formula for predicting soil loss resulting from sheet and rill erosion caused by rainfall.

UPDIP PINCH OUT OF SANDSTONE TRAP. An updip pinch of wedge out of a sandstone in shale forms a trap. These are common in coastal plains where updip is landward. They tend to be small traps. If uplift caused dip, the trap type is combination.

UTILIZATION. The proportion of current year's forage production that was consumed or destroyed by grazing animals; usually expressed as a percentage.

VALID EXISTING RIGHTS. Legal interests that attach to a land or mineral estate that cannot be divested from the estate until that interest expires or is relinquished.

VANDALISM. Willful or malicious destruction or defacement of public property; e.g., cultural or paleontological resources.

VEGETATION MANIPULATION. Planned alteration of vegetation communities through use of prescribed fire, plowing, herbicide spraying, or other means to gain desired changes in forage availability, wildlife cover, etc.

VEGETATION TYPE. A plant community with immediately distinguishable characteristics based upon and named after the apparent dominant plant species.

VERTEBRATE. An animal having a backbone or spinal column.

VISUAL RESOURCES. The visible physical features on a landscape (topography, water, vegetation, animals, structures, and other features) that comprise the scenery of the area.

VISUAL RESOURCE MANAGEMENT (VRM). The inventory and planning actions taken to identify visual resource values and to establish objectives for managing those values, and the management actions taken to achieve the visual resource management objectives.

VISUAL RESOURCE MANAGEMENT CLASSES. VRM classes identify the degree of acceptable visual change within a particular landscape. A classification is assigned to public lands based on the guidelines established for scenic quality, visual sensitivity, and visibility.

VRM CLASS I. This classification preserves the existing characteristic landscape and allows for natural ecological changes only. Includes Congressionally authorized areas (wilderness) and areas approved through the RMP where landscape modification activities should be restricted.

VRM CLASS II. This classification retains the existing characteristic landscape. The level of change in any of the basic landscape elements due (form, line, color, texture) to management activities should be low and not evident.

VRM CLASS III. This classification partially retains the existing characteristic landscape. The level of change in any of the basic landscape elements due to management activities may be moderate and evident.

VRM CLASS IV. This classification provides for major modifications of the characteristic landscape. The level of change in the basic landscape elements due to management activities can be high. Such activities may dominate the landscape and be the major focus of viewer attention.

VRM CLASS V. This classification applies to areas where the characteristic landscape has been so disturbed that rehabilitation is needed. Generally considered an interim short-term classification until rehabilitation or enhancement is completed.

VISUAL SENSITIVITY. Visual sensitivity levels are a measure of public concern for scenic quality and existing or proposed visual change.

WAIVER. Permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.

WILDERNESS. An area formally designated by Congress as a part of the National Wilderness Preservation System.

WILDERNESS CHARACTERISTICS. Identified by Congress in the Wilderness Act of 1964; namely, size, naturalness, outstanding opportunities for solitude or a primitive and unconfined type of recreation, and supplemental values such as geological, archaeological, historical, ecological, scenic, or other features.

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WILDERNESS INVENTORY. An evaluation of the public land in the form of a written description and a map showing those lands that meet the wilderness criteria as established under Section 603(a) of FLPMA and Section 2(c) of the Wilderness Act. The lands meeting the criteria will be referred to as WSAs.

WILDERNESS MANAGEMENT POLICY. Policy document prescribing the general objectives, policies, and specific activity guidance applicable to all designated BLM wilderness areas. Specific management objectives, requirements, and decisions implementing administrative practices and visitor activities in individual wilderness areas are developed and described in the wilderness management plan for each unit.

WILDERNESS STUDY AREA (WSA). An area determined to have wilderness characteristics. Wilderness Study Areas will be subject to interdisciplinary analysis through BLM land use planning system and public comment to determine wilderness suitability. Suitable areas will be recommended to the President and Congress for designation as wilderness.

WITHDRAWAL. An action which restricts the use of public land and segregates the land from the operation of some or all of the public land and mineral laws. Withdrawals are also used to transfer jurisdiction of management of public lands to other federal agencies.

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APPENDIX A

PROPOSED ACTION

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BLM AUTHORITY AND RESPONSIBILITIES FOR OIL AND GAS OPERATIONS

The BLM has responsibility for environmental protection, public health, and safety related to oil and gas operations on public lands. There are three pieces of legislation that give primary direction to the BLM for these operations: the Mineral Leasing Act of 1920, as amended, the National Environmental Policy Act of 1969 (NEPA), and the Federal Land Policy Management Act of 1976 (FLPMA). There is other legislation that affects various aspects of development. Most notably, these include laws to protect cultural resources and endangered species.

The law which directs the BLM to make public land available for development of oil and gas resources is the Mineral Leasing Act. This legislation directs the BLM to make all public land available for oil and gas development with the exception of specific lands, such as National Parks, which are listed in the Act or its amendments.

The National Environmental Policy Act of 1969 (NEPA) directs all federal agencies to analyze and disclose to the public the impacts of major federal actions. Oil and gas leasing is a major federal action by definition. The BLM prepares an environmental impact statement (EIS) to fulfill the mandate of NEPA (hence, this document).

The Federal Land Policy and Management Act of 1976 (FLPMA) instructs the BLM to prepare and disclose to the public its plans for the public lands under its jurisdiction. Since the Mineral Leasing Act requires us to make public land available for leasing and since the leasing could lead to development that may have impacts on the environment, all three pieces of legislation are tied together in a workable process to accomplish the Congressional intent. The primary focus of the process for oil and gas development is the

BLM Resource Management Plan/Environmental Impact Statement (RMP/EIS). Within the RMP, plans are disclosed for development/conservation of oil and gas (as well as all other resources and values). The RMP also serves to analyze and disclose the environmental impacts of the projected development.

Once decisions have been reached through the planning process as to what lands are available for leasing and under what conditions, they are offered for sale at auction. Those people interested in purchasing oil and gas leases may nominate a parcel, or the BLM may offer parcels of its choosing. In either case, the proposed parcel must conform to the RMP decisions and be offered for sale at a public auction. Those parcels which do not sell at the auction are available for non-competitive sale for a two-year period thereafter.

Management decisions are incorporated in the lease document as stipulations and notices before it is issued. Public notice of the sale (which includes the list of parcels offered, their location, and the stipulations to be attached) is given 45 days prior to the sale. Significant change to the stipulations made after the lease is issued is also posted for public notice for 30 days prior to making the change.

The purchaser of a lease at the auction must bid at least two dollars per acre. The bonus bid must be paid at the sale and the rental is due at the beginning of each new year as long as the lease is held and is not producing. Leases purchased at auction may be held for five years without production. Leases purchased non-competitively after the auction may be held in non-producing status for ten years. If the lessee establishes production, a royalty of twelve and one-half percent must be paid to the government. Half of that money is returned to the state and county of origin for their use. The other half goes into the federal treasury earmarked for reclamation

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projects, the National Forest System, National Park Service, etc.

Separate from leasing actions, geophysical explorationists may explore for oil and gas on public land. Geophysical exploration on public land requires approval of the methods employed and mitigation of impacts. The BLM Resource Area Office must receive a copy of the Notice of Intent to perform geophysical operations. The exploration plan is analyzed for conformance with the Resource Area Resource Management Plan/EIS and mitigative measures and reclamation requirements are attached to the approval. BLM specialists examine the Notice of Intent (the plan of operations) and the site, or "line," to be explored, as well as the RMP in determining appropriate mitigative measures and reclamation requirements.

The majority of geophysical exploration operations conducted on public lands are done by exploration companies. Some are associated with petroleum producers, many are not. Geophysical exploration operations may also be conducted on a lease held by the lessee with the same requirements for mitigation of impacts and reclamation. (See further discussion of oil and gas exploration below.)

A well must be drilled in order to produce oil and/or gas from the lease. Before drilling a well, the lessee, or an operator for the lessee, must file an Application for Permit to Drill (APD). The operator must file the application with the District or Resource Area Office in which the action will take place. The application must include a plan for the drilling of the well and a plan for the protection of the surface and environment. The drilling plan contains information as to the depth of the well, how it will be constructed, how groundwater and other mineral resources will be protected, and how blow-outs and other emergencies will be prevented or dealt with. The surface use plan covers such concerns as the location and amount of surface disturbance and how that disturbance will be reduced or eliminated. It covers mitigation of impacts to wildlife, cultural resources, vegetation, soil, surface water, and other land uses and values. Each resource/value is evaluated in light of the RMP decisions. The operator is responsible for incorporating all RMP decisions in the proposed APD. If the

APD does not have the appropriate information and mitigation incorporated, the application may be modified or rejected. In most APDs in Colorado, the few RMP decisions not incorporated by the operator are attached to the approved application by the BLM as Conditions of Approval (COAs).

At a minimum, each APD is reviewed by a BLM geologist, petroleum engineer, and surface reclamation specialist and by the Authorizing Officer (Area or District Manager). The geologist evaluates the need for groundwater and other mineral resource protection and the structural competency of casing point formations. The petroleum engineer evaluates the drilling plan, the well construction, and the safety of the operation. The surface reclamation specialist evaluates the surface plan, checks the proposal against the RMP and other guidance, conducts the on-site inspection, analyzes impacts, proposes mitigation, and writes the Environmental Assessment (EA). The surface reclamation specialist also calls upon other expertise as needed in the analysis of impacts and recommendation of mitigation and reclamation requirements. For example, the BLM archaeologist would recommend any needed mitigation for impacts to cultural resources.

APD information is posted in the local authorizing office for a 30-day public notice period. The APD may not be approved until the comment period has expired. Each lease where an APD is proposed is checked to see if a bond has been posted to cover abandonment of the well should the lessee/operator default on their obligations under the lease. Each application is evaluated as described above, and subjected to a field inspection of all proposed disturbed areas. Appropriate, site-specific mitigation is then attached to the APD as COAs. A cultural resource inventory is conducted for each APD, and a report sent to the Resource Area archaeologist for evaluation. In designated areas, endangered species or other inventories may be conducted. The proposal is subjected to a National Environmental Policy Act (NEPA) review (an EA) that checks for conformance with the RMP and determines whether or not there is a need for additional review (i.e., an expanded EA or Environmental Impact Statement). EAs are prepared for all APDs on federal lands in

Colorado. When all impacts are analyzed, all necessary mitigation incorporated, and the public notice period expired, the APD may be approved.

In cases where the proposed well is obviously part of a larger field development, and such development has not already been scrutinized by a NEPA document other than the RMP, a "field development" EA is prepared. This EA looks at conformance of the specific field development with the general development analyzed in the RMP. As with the APD EA, an EIS is prepared if the projected field development does not conform with the analysis of field development in the RMP.

Over the life of a field, other operations, such as construction of power lines, pipelines, use of secondary and tertiary recovery methods, and other production facilities may become necessary. Each new surface disturbance is subjected to the same RMP test. Each is analyzed to determine impacts and mitigation. New ideas and technology are incorporated into new mitigative measures as they become available and when they do not impact the lease rights granted. New ideas and technology may also require amendment or maintenance of the RMP/EIS prior to use as mitigation.

As the well(s) plays out and comes to the end of its usefulness, it is abandoned and the disturbed area reclaimed. The operator must submit an abandonment notice for approval. The notice is evaluated by a petroleum engineer to determine that the well will be plugged so as to protect freshwater zones, other mineral resources, and the surface from contamination by any oil or gas that might leak up from the depleted reservoir or other fluids and gases up hole or on the surface that could migrate through the old well bore (and casing if left in place) to harm other resources. The surface reclamation specialist checks the final reclamation proposal to insure it is in accordance with the original APD requirements, and, in some cases, incorporates the latest methods of reclamation. Reclamation is required to restore the well site, road, and other disturbances to as original (or better) a condition as possible. The surface reclamation specialist also inspects the location once or twice at approximately one-year intervals to monitor the progress of

reclamation. If the reclamation does not meet the requirement set out in the APD, the operator will re-do those portions necessary to complete the goals for the reclaimed area. The well will continue to be monitored until the surface reclamation specialist is satisfied that the reclamation has succeeded and the location is stable.

The BLM authority to require reclamation has only existed since the passage of the Federal Land Policy Management Act of 1976. Wells abandoned prior to that time were reclaimed haphazardly at best and primarily as gratis by the companies involved. These older unreclaimed sites are reclaimed by the BLM as the need arises and money is available. In the majority of cases "natural reclamation" has stabilized and revegetated the site. An attempt to further reclaim the location at this time would do more harm than good. We only reclaim such locations when a serious erosional or other problem has developed. Some unreclaimed locations are reclaimed by a new lessee as part of a new lease agreement.

Field operations are inspected by the BLM to assure accountability of royalties, and compliance with the lease and permit safety and environmental requirements. Field inspections are made to wells at the pre-drill, construction, drilling, and production phases. Inspections are also made at the plugging of the well, during reclamation, and periodically thereafter as necessary to insure the reclamation is effective. Petroleum engineering technicians and surface reclamation specialists have primary responsibility for field inspections, however, other specialists may inspect wells as needed. Typically these specialists include petroleum engineers, geologists, archaeologists, wildlife biologists, range conservationists, and others.

The primary function of the petroleum engineering technician is to account for accurate and complete measurement of production. They perform inspections to check the installation and calibration of measuring devices such as tanks for oil and flow meters for gas. Petroleum engineering technicians also inspect for environmental, public health, and safety concerns.

Operators are required to submit monthly production reports which go to the Minerals

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Management Service (MMS) and are available to the BLM inspectors electronically. The BLM verifies the report in the field and the MMS verifies the royalty payment. The two agencies work together to insure that all production is accounted for and royalty is paid.

Operations which fall within the jurisdiction of other federal or state and local agencies may also be field inspected by those agencies. The BLM has several agreements with other agencies that specify conditions where the BLM will notify the agency of violations within that agency's jurisdiction and in turn the agency will notify the BLM of violations within its jurisdiction.

Oil and Gas Exploration and Development

Oil and gas exploration and development activities progress through five phases that are, in part, sequential and may overlap in time: preliminary exploration, exploratory drilling, development, production, and abandonment. Leases are obtained before the second phase (exploratory drilling).

Preliminary Exploration

Petroleum exploration occurs in unexplored portions of areas where petroleum is known or thought to occur in commercial quantities. An area where petroleum is thought to occur in commercial quantities is known as a frontier or rank wildcat area. With declining known oil and gas supplies, it has become profitable to explore for oil and gas in less promising geological provinces and in areas where the climate, terrain, depth of deposits, and other obstacles have discouraged previous efforts. Increasingly sophisticated exploration techniques, improved oil and gas drilling, and transportation technologies have also enhanced prospects for locating, extracting, and marketing petroleum resources.

Geological Exploration

Where the bedrock geology of an area is well exposed, it is often possible to predict where oil might gather. The potential traps (anticlines, faults, or formations with varying porosity) can sometimes be located with the aid of published geologic maps, aerial photos, and landsat imagery. Occasionally,

additional data will be gathered by aircraft. Low altitude reconnaissance flights, frequently at elevations of 100 to 500 feet, help identify rock outcrops that can be studied later on the ground. Next, one or more geologists may examine and sample the rock outcrops in the area and map the surface geology. Geological exploration can be performed with little surface damage; four-wheel drive pickups, motorcycles, or all terrain vehicles can be used to cover the area.

Geophysical Exploration

Subsurface geology is not always accurately indicated by surface outcroppings. In such cases, geophysical prospecting methods are used to define subsurface structure. Three geophysical survey techniques can be used to define subsurface characteristics through measurements of the gravitational field, the magnetic field, and seismic reflections.

Gravity and magnetic surveys indirectly measure course subsurface structure. The field work involves small portable units which are easily transported via light off-road vehicles, such as four-wheel drive pickups and jeeps, or aircraft. Off-road vehicle traffic is common in these two types of surveys. Sometimes, small holes (approximately one inch by two inches by two inches) are hand dug for instrument placement at the survey measure points. These two surveys can make measurements along defined lines but it is more common to have a grid of discrete measurement stations.

Seismic reflection surveys are the most common of the geophysical methods and produce the most detailed subsurface information. The seismic method detects subsurface geologic structural information by producing a source wave at or near the surface that bounces off subsurface layers. The "echoes" or seismic reflections are recorded as a function of time. The deeper the subsurface reflecting layer, the later in time it is detected. The weak seismic reflections are detected at the surface by arrays (groups) of seismometers or geophones that are very similar to microphones. The geophone electrical signals are sent by a connecting cable to the Recorder unit where the signals are amplified and then recorded on a multi-track magnetic tape.

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The tape is later sent to a computing center where it is rearranged and computer enhanced to present the subsurface reflections in a graphic picture called a Seismic Section. The seismic reflections are very weak requiring very sensitive geophones. While the geophones can "hear" the desired reflections, they also detect:

- cars and trucks,
- people and animals moving about,
- water wells pumping,
- airplanes (at tens of thousands of feet in the air),
- trains (many miles away),
- the wind blowing, and
- trees and shrubs moving in the wind.

Any of these other activities can produce a "noise" at the geophone which often is stronger than the desired seismic reflections.

The seismic reflection method needs the seismic source and geophone arrays along a straight line. Sometimes it is possible to work along existing roads if the roads are straight. Where practical, existing roads are used to facilitate access to the seismic operations. The geophone arrays are normally straight along the line length. However, in difficult seismic data areas, they may have considerable width. To understand the subsurface structures in three dimensions, it is necessary to have seismic lines recorded in a "cross" or line gridded pattern. The grid spacing between lines can be from a fraction of a mile apart to many miles apart depending on the exploration purpose. The exploration purpose will also determine what latitude, if any, there is in moving these lines.

The work of a seismic crew begins with the Permit Agent obtaining permits from private landowners and government agencies. The survey crew next places pin flags and other markers at uniform intervals along the seismic line and carefully measures the markers in relation to precisely known geographic locations. For a shot hole explosive seismic source, drilling rigs will be working on the seismic line. When the complete seismic line is ready, the geophone crew arrives and places the geophones in arrays in precise locations to the flagging and lay connecting cables between the geophone arrays and the recorder unit. After the seismic reflection data is recorded, the geophone crew picks up all the geophones

and connecting cables and cleans up the seismic line. Most of these individual steps involve one or more equipment trucks to travel the seismic line if the terrain is driveable.

The seismic reflection method is usually referred to by the type of seismic source. The most common seismic sources are vibrator, shot hole explosive, and surface explosive.

The geophysicist, in determining the seismic exploration program parameters, will pick the most appropriate seismic source based on the depth of exploration interest and the degree of detail needed to define the subsurface structure.

Vibrator Source

The vibrator method uses a 4x4 or 4x6 wheel drive truck or buggy mounted hydraulic vibrator source. Their primary physical feature is a pad (about four feet square) that is slowly lowered from the center of the truck or buggy to make contact with the ground. Connected to the pad is the Reaction Mass. The Reaction Mass is moved a few inches up and down hydraulically in a carefully controlled manner to send a seismic source wave into the ground.

The vibrator is a weak seismic source and requires two to eight vibrators working together to create detectable reflections. Since it is a weak source, it has been used successfully to gather seismic reflection information in difficult high population areas such as Los Angeles and Paris.

To be able to use the vibrator source method, it is required that the seismic line goes along a straight road, or if cross country, over gentle, rolling driveable terrain.

Conventional Drilled Shot Hole Source

The shot hole explosive source requires the drilling of a hole to a predetermined depth, placing explosives at the bottom of the hole and back filling the hole with cuttings if the hole is air filled, or bentonite chips if the hole is naturally water filled.

Shot hole drilling depths will range normally from 25 to 200 feet. The explosive charge size can range from five to fifty pounds. The

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hole diameter is typically two to six inches. The drill rigs are most often truck or buggy mounted. Cuttings from drilling the hole are normally scattered by hand near the shot hole or put back in the shot hole after explosive charge placement. Proper preplugging of the shot hole with tamped cuttings or bentonite chips prevent the view commonly shown in the movies of holes "blowing out." There are some special source testing situations which need the detonation of charges in open holes. A shot hole that "blows out" causes a very poor seismic source wave which is very detrimental to the seismic reflection method. Detonation of a properly preplugged shot hole will create the best seismic source wave and cause no surface disturbance.

Portable Drilled Shot Hole Source

Special limited depth drill rigs can be moved in pieces by a helicopter. Helicopter portable drills are used where access limitations or topography restraints prevent use of conventional truck or buggy mounted drill rigs. This is a very expensive option which also places significant limits on the depth of drilling, and consequently, the size of the explosive charge. These limits can severely restrict the reflection methods ability to define subsurface structures.

Surface Explosive Source

The surface explosive source method involves placing puds (pouches) of explosives on a number of stakes driven into the ground. This is also called the Poulter method, named after its developer.

The explosive puds range in size from a pound to five pounds. The stakes are typically four to eight feet in height. The number of stakes used in the source array can range from a few to the more common ten. Occasionally the explosives are placed on the ground or snow, but this is a less effective source wave technique. Use of tall (six foot) stakes or placing the explosives on the surface of deep snow results in little visible surface disturbance, in contrast to the noise level of the detonations. The surface explosive method is very mobile. Generally 4x4 vehicles are used for transportation, although it can be supported with animal pack teams or helicopters.

Mini-hole Explosive Source

The mini-hole explosive source can be used in favorable conditions. A very small portable unit is used to drill a number (a source array) of small diameter shallow holes. The holes are usually two-to-three inches in diameter, drilled to depths of five-to-fifteen feet and each hole loaded with a small, one pound or less, explosive charge. These holes are detonated simultaneously to produce a seismic source wave. However, this method is usually limited to defining shallow subsurface structures, and therefore, can not often be substituted for the significantly more effective deep shot holes.

A given area may be explored several times by the same or different companies over a period of time. Multiple exploration is undertaken for a variety of reasons--first attempts may have been unsuccessful, the depth of exploration interest may have changed, other competitive companies want their own information, or improved techniques and/or equipment are used.

All the work required to obtain exploration seismic data does not guarantee that the data will indicate any necessary subsurface structures--let alone a subsurface structure containing hydrocarbons. For the explorationist, the unfortunate reality is that obtaining seismic data most often leads to the decision that an area does not have adequate subsurface structures or structures containing economic hydrocarbons and therefore no drilling will follow.

TYPES OF OIL AND GAS DRILLING AND PRODUCTION

Oil and gas wells are drilled primarily with rotary drilling rigs. The rigs use mud or compressed air as a medium to cool the drilling tools, carry cuttings to the surface, and, in the case of mud, to stabilize the drilled hole. In the early days of drilling, the "cable tool" rig was the predominant method of drilling. Cable tools were largely replaced by rotary rigs in the 1950s. Some of the oldest wells still producing in Colorado were drilled with cable tool rigs.

The method of drilling is generally the same regardless of the target production. The depth of the target usually has more to do with the method of drilling than the type of

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production. In general, deeper wells require larger rigs which in turn require larger drill pads. Because oil is more valuable than gas, gas wells tend to be shallower in depth. The reason being that deeper wells cost more and the lower profitability of gas production means they do not bear the higher cost of deeper wells. The size of the anticipated production also has a bearing on the expense a given production will bear. For example, a very large gas producing reservoir may better bear the cost of deeper drilling than a shallow, low producing oil reservoir. But, all else being the same deeper reservoirs cost more to develop than shallow ones.

The biggest differences among the various types of oil and gas wells occur in the production phase of operations. The same basic rotary drilling methods are used for drilling all types of oil and gas wells.

Oil and Gas Co-Production

Reservoirs that produce both oil and natural gas require the siting of facilities for the production, clean-up, and storage and/or transportation of the products on location (i.e., the well pad). If the well produces naturally, that is the gas and oil flow to the surface under natural pressures, only a series of pipes and valves at the well "head" are required to regulate the flow of product to the surface. If there is no, or insufficient, natural pressure, a pump is installed to lift the product to the surface. Once the oil and gas comes to the surface, it travels through pipes to separation equipment where water and gases such as carbon dioxide are removed, and the gas and oil are separated. The water and oil are piped to respective storage facilities and the gas put into a transmission pipeline. In a few cases, separation/clean-up and/or storage facilities are located off of the well pad for common use by more than one well. But, in the great majority of the wells in the Study Area, all facilities are located on the same pad on which the well was drilled.

Gas is transported to market through a network of gathering pipelines from each well to a transmission line. The gathering system usually consists of pipe of two-to-four inches in diameter which is laid on the ground or buried several feet below the surface. BLM most often requires that lines be laid near the access road or buried under it to save additional surface disturbance. Measurement

of gas is usually through a differential pressure recorder on the well pad.

Oil is produced into tanks either on the well pad or a common tank near the well. The oil is measured for sale from these tanks and transported to distribution points by special truck. In the case of some highly productive fields, oil carrying pipelines may be laid to a distribution point or refinery. In these cases, there is a network of pipelines to each well similar to that for the gas gathering system. The oil gathering lines are usually four to six inches in diameter, and measurement is either through a sales tank or a sales meter attached to the line.

In some areas, hydrogen sulfide (also known as H₂S or sour gas) may be found with the hydrocarbon production. In these cases, special stainless steel pipe is used to contain the production until the hydrogen-sulfide can be separated from the hydrocarbons. The hydrogen sulfide is disposed of by incineration or neutralized by sulfur extraction.

Oil Production

Typically, oil is produced in association with water and gas; however, in some cases oil is produced with almost no water or associated gas. The facilities to produce such oil are the same as those described above without the equipment for gas clean-up and measurement.

Dry Gas Production

Dry gas is a term applied to any natural gas produced without oil. It usually has some water associated and may have a small amount of light liquid hydrocarbons, called "drip" or condensate. Dry gas wells typically have only a "christmas tree" or valve/gauge assembly, showing above ground. Production facilities may include a pit or tank for the collection of separated produced water and a small tank for the storage of the liquid hydrocarbons. As with oil and gas production, there is a gathering pipeline and sales meter for gas distribution.

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Carbon Dioxide Production

Carbon dioxide is produced in a manner similar to dry gas. But, carbon dioxide, in combination with water, may form carbonic acid which is very corrosive. Therefore, the produced gas must be "cleaned," that is have the impurities removed, as soon as possible after it reaches the surface. For that reason, stainless steel piping is used from well head to separator, and separators are placed as close as possible to the well head. Usually a single large separator is located so as to service several wells. The use of some stainless steel pipe and common separators are the two most distinguishing surface features of carbon dioxide production.

Coal Bed Methane Production

Methane is commonly found in association with coal. It is produced either from the coal beds themselves or from nearby reservoir rock to which it has migrated from coal beds. It is produced by the same drilling and production techniques as other gases. The one difference between coal bed methane coal bed methane and other natural gas production is that where it is produced with associated water, the water production begins at a relatively high rate and declines to a very small amount over the first two to three years while the gas production increases inversely. If production is interrupted, that is the well is "turned off" or shut down, upon re-start the water-gas ratio will be approximately the same as when the well was first produced. This phenomenon means that a great deal of water must again be produced before economic gas production is re-established. Not all coal bed methane production involves large amounts of produced water. Initial tests in Little Snake Resource Area, for example, indicate only minor associated water.

Exploratory Drilling

Drilling does not begin until a lease has been acquired by the operator. When preliminary investigations are favorable and warrant further exploration, exploratory drilling may be justified. Stratigraphic tests and wildcat tests are the two types of exploratory drill holes.

"Strat" tests involve drilling relatively shallow holes to supplement seismic data.

These tests aid in revealing the nature of near-surface structural features. The holes are usually from 100 to several thousand feet deep, and are drilled primarily by rotary drill rigs. As the rock is drilled, the resulting rock chips are brought to the surface by a high-pressure airflow or circulating drilling mud. Samples of these chips are collected, bagged, and identified as to depth of origin. They are then studied by a geologist to determine such data as rock type, age, and formation.

Truck-mounted drilling equipment for strat tests is fairly mobile; therefore, roads and trails to test sites on level solid ground are temporary and involve minimal construction. In hilly or mountainous areas, more road building is necessary.

Generally, access roads are bladed 12 to 14 feet wide and are not crowned or ditched. Some roads may simply be surface scraped; i.e., vegetation is clipped off next to the soil surface. Other roads may require cuts in excess of 20 feet and fills exceeding ten feet. Strat tests requiring a large amount of construction (i.e., several acres of cut and fill described previously) are unusual since construction costs may outweigh the information gained.

A space of about one-half acre or less is leveled and cleared of vegetation for the average drill site. If high pressure air is used to remove rock chips or rock cuttings, rock dust may be emitted to the air when samples are not being collected. If mud is used as a drilling fluid, mud pits may be dug; more commonly, portable mud tanks are used. Usually one to three days are required to drill the test holes, depending on depth to and hardness of the bedrock. In areas with shallow, high-pressure, water bearing zones, casing may be required to keep water out of the hole.

After the surface and subsurface geological studies, the seismic, and other geophysical surveys, comes the evaluation of the prospect. Only by drilling a wildcat well (a well drilled in unproved territory) will the oil company know if the rocks in the prospect they have identified contain oil or gas.

Nationally, about one in 16 wildcat wells produces significant amounts of oil or gas. Locally, success ratios may be as high as one in ten.

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The deeper wells may require several months or more to complete; shallower wells up to a few thousand feet deep may be completed in as little as a few weeks. As a general rule, the deeper the test, the larger the drilling rig and facilities required.

Prior to approval for drilling, on-site inspections are conducted with the proposed drill pad and access road staked out, to assess potential impacts and attach appropriate mitigative conditions to the permit to drill. A drill "pad" (well site) from one to four acres in size is then cleared of all vegetation, and leveled for the drill rig, mud pumps, mud (or reserve) pit, generators, pipe rack, and tool house. Topsoil and native vegetation is usually removed and stockpiled for use in the reclamation process. The mud pit may be lined with plastic or bentonite to prevent fluid loss or prevent contamination of water resources. Other facilities such as storage tanks for water and fuel are located on the pad or are positioned nearby on a separate cleared area. If the well site is not large enough for the equipment required to rig-up (prepare the drilling rig for operation), a separate staging area may be constructed. Staging areas are usually no larger than 200 feet by 200 feet and may simply be a wide flat spot along the access road on which vehicles and equipment are parked.

Five thousand to 15,000 gallons of water a day may be needed for mixing drilling mud, cleaning equipment, cooling engines, etc. for each well. A surface pipeline may be laid to a stream or a water well, or the water may be trucked to the site from ponds or streams in the area.

The rigs are very large and may be moved in pieces. In some instances, rigs can be moved short distances on level terrain with little or no dismantling of equipment which will shorten the tearing-down and rigging-up time. Moving a dismantled rig involves use of heavy trucking equipment for transportation, and crews to erect the rig. Gross weight of vehicles may run in excess of 80,000 lbs.

In order to move a drill rig and well service equipment from one site to another, and to allow access to each site, temporary roads may be built. These roads are generally 16-to-18 feet wide (driving surface) and may be as short as 200 feet or as long as ten miles or

more. Bulldozers, graders, and other types of heavy equipment are used to construct and maintain temporary wildcat roads.

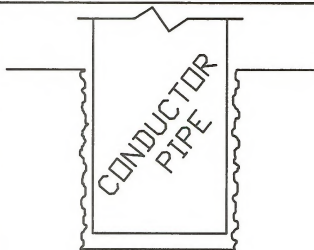
The start of a well is called "spudding in." A short piece of tubing called conductor pipe is forced into the ground (sometimes with a piledriver), and cemented in place. This keeps surface sand and dirt from sloughing into the well hole. Next, the regular drill bit and drill string (the column of drill pipe) take over. These pass vertically through a heavy steel turntable (the rotary table) on the derrick floor and the conductor pipe. The rotary table is geared to one or more engines, and rotates the drill string and bit. As the bit bores deeper into the earth, the drill string is lengthened by adding more pipe to the upper end. (See Figure A-1).

Once the hole reaches a depth of several hundred feet, another string of pipe (the surface casing) is set inside the conductor pipe and cemented in place by pumping cement between the casing and hole wall. Surface casing acts as a safety device to protect freshwater zones (aquifers) from drilling fluid contamination. To prevent the well from "blowing out" in the event the drill bit hits a high pressure zone, "blowout preventers" (large metal rams) are installed around the surface casing just below the derrick floor. These rams will close around, crushing the drill string and sealing the well in the event of a blowout.

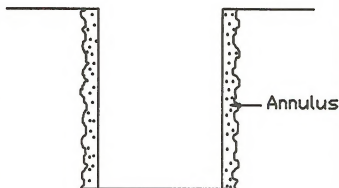
After setting the surface casing, drilling resumes using a smaller diameter bit. Depending on well conditions, additional strings of casings (intermediate casing) may be run (installed) before the well reaches the objective depth (total depth or "T.D.").

During drilling, a mixture of water, clay, and chemical additives known as "mud" are continuously pumped down the drill pipe. It exits through holes in the bit and returns to the surface outside the drill pipe. As the mud circulates, it cleans and cools the bit and carries the rock chips (cuttings) to the surface. It also helps to seal off the sides of the hole (thus preventing cave-ins), and to control the pressure of any water, gas, or oil encountered by the drill bit.

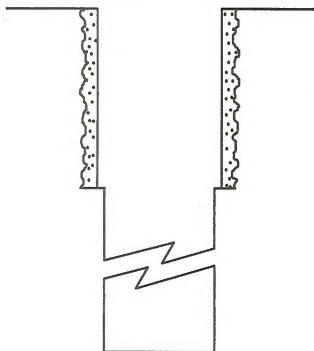
The mud is the first line of defense against a possible blow-out since it is used to control pressure. It is for this reason that a pit full of



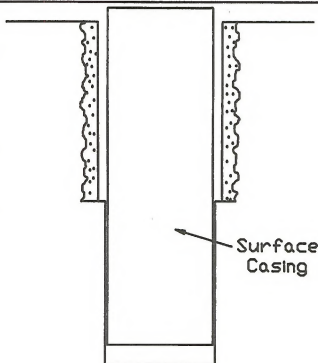
1. Well is initially started with an oversized bit and drilled up to 50 feet deep. A large-diameter pipe known as a conductor pipe is lowered into the hole to keep surface soil from sluffing into the hole while the surface casing hole is being drilled out.



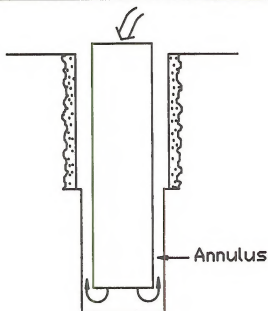
2. Cement is placed in the annulus (the space between the well hole and the pipe or between a smaller and larger pipe).



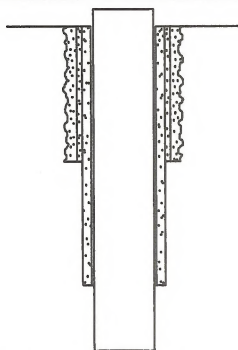
3. Surface casing hole is drilled out from inside the conductor pipe to a predetermined depth, typically about 10% of the total depth.



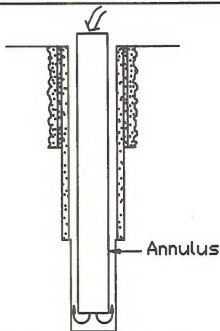
4. Surface casing is lowered into the hole.



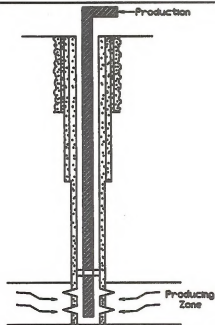
5. Cement is pumped down the surface casing and forced up the outside through the annulus. The cement is used to hold the surface casing in place. It protects shallow fresh water and other mineral zones.



6. The well is deepened using a bit smaller than the surface casing. The well is now drilled to its final depth. In deep wells, intermediate casing is set before drilling to the final depth.



7. The intermediate casing, or production casing is lowered into the hole. Cement is pumped down the casing and up the outside through the annulus to seal the casing in place. This cement will also isolate and protect all hydrocarbon-bearing zones, fresh water zones, and other zones of interest.



8. Once the production casing is in place, perforations are made through the casing and cement into the producing formation. Techniques are then used to increase the flow of oil and gas into the well. Production tubing is hung down the well to the producing zone. Oil and gas flow into the well and either flow or are pumped up the production tubing to the surface.

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"reserve" mud (the reserve pit) is maintained on location. The reserve mud is used in emergencies to restore the proper drilling environment when radical or unexpected changes in down-hole pressure are encountered.

The cuttings are separated from the mud and sampled so that geologists can note and analyze (log) the various strata through which the bit is passing. The rest of the cuttings pass into the reserve pit as waste. Some holes are drilled at least partially with compressed air which serves the same purpose as drilling mud of cooling and cleaning the bit and evacuating the cuttings from the hole.

During or at completion of drilling activity, the well is logged. Logging means measuring with geophysical instruments the physical characteristics of the rock formations and associated fluids through which the borehole passed. These instruments are lowered to the bottom of the well, and slowly raised to the surface while recording data. Other measuring procedures include the drill stem test, in which pressures are recorded and fluid samples taken from zones of interest. After studying the data from those logs and tests, the geologist and/or petroleum engineer decide if the well will produce petroleum.

If the well did not encounter oil and gas, it is plugged with cement and abandoned. The well pad and access road are recontoured and revegetated.

If the well will produce, casing is run to the producing zone and cemented in place. A proper cementing of the production casing string is required to provide coverage and prevent interzonal communication between oil and gas horizons and usable water zones. Initially, this is accomplished by placement of steel casing from the ground surface to a depth generally ranging between 200 and 1,000 feet. The actual length of this "surface casing" is dependent on factors such as depth of freshwater zones, anticipated formation pressures, and the length of the next smaller casing to be set. The annular space between the borehole and the exterior of the surface casing is required to be filled with cement. Cement is pumped down the casing and around the bottom until cement is returned to the surface outside of the casing. This

ensures cement completely fills the annular space and precludes interzonal migration of formation fluids (i.e., groundwater). Following the placement of surface casing, the hole is drilled deeper and more casing is installed. Cement is placed in a similar fashion to the surface pipe, however, a quantity of cement sufficient to cover and isolate only those zones having hydrocarbons, usable water, or other mineral values.

The exception to this is coal-bed methane wells in the SJ/SMIPA. In order to ensure isolation and protection of all zones between the surface and total depth, cement is required to be circulated from bottom to top on the production casing as well as on the surface casing. If cement is not circulated to surface, shallow water may not be protected.

If the determination is made that water monitoring wells are necessary in a given area, a separate borehole specifically designed as a monitoring well should be completed. Logical placement of a monitoring well would be in a protected location at the edge or just off of the well pad (generally 100-200 feet from producing well bore). It should be noted also that monitoring wells and other relatively shallow boreholes have often had adverse impacts on the most critical groundwater source due to interzonal flows and introduction of bacteria and other contaminants into the system. The drill rig is usually replaced by a smaller rig that is used for the final phase of completing the well.

Development

If a wildcat well becomes a discovery well (a well that yields commercial quantities of oil or gas), development wells will be drilled to confirm the discovery, to establish the extent of the field, and to efficiently drain the reservoir. The procedures for drilling development wells are about the same as for wildcats, except there is usually less subsurface sampling, testing, and evaluation. If formation pressure can raise oil to the surface, the well will be completed as a flowing well. Several downhole acid or fracture treatments may be necessary to enhance the formation permeability to make the well flow.

When a well is "acidized," this refers to the process of placing acid in the well bore

across the productive interval which causes the solution of some of the mineral materials (e.g., calcicide, dolomite, etc.) which reside around the pore space. Upon solution and removal of these minerals, porosity and permeability are enhanced. When a well is hydro-fractured, it simply means fluid, usually gelled water, is pumped down the well, through perforations in the casing and into the formation. Pumping pressures are increased to the point where the formation fractures or breaks, and the sand is added to the injection fluid to "prop-open" the crack once the pressure is released. The pressures required to fracture a given formation is generally quite predictable based on rock type and depth. For some formations, especially coals, abnormally high pressures are required to fracture them. Pressures, volumes, and rates are all measured and monitored during the fracture process. These parameters provide information as to how the formation is behaving and if the fracture is propagating within the desired interval (i.e., staying in zone). This is especially true in coals, as sustained "high" injection pressure indicates the fracture is moving through the coal. If pressures fall off, it indicates the fracture has extended beyond the coals and the operation can be halted. In addition to using the foregoing parameters to monitor fracture behavior, other methods for fracture geometry and extent available (e.g., tracer and ultrasonic surveys). Control is maintained throughout the fracture operation.

A free-flowing well is simply closed off with an assembly of valves, pipes, and fittings (called a christmas tree) to control the flow of oil and gas to other production facilities. A gas well may be flared for a short period to measure the amount of gas per day the well can produce, then shut in or connected to a gas pipeline.

If the well is not free-flowing, it will be necessary to use artificial lift (pump) methods. These are explained, along with well production equipment and procedures, in the following section on production. After a pump is installed, the well may be tested for days or months to see if it is economically justifiable to produce the well and to drill additional development wells. During this phase, more detailed seismic work may be run to assist in precisely locating the petroleum reservoir and to improve previous seismic work.

Coal-bed methane wells generally require artificial lift to remove formation water which reduces the confining pressure causing gas to be released (desorbed) from the coals. Once the gas is freed from the coal surfaces, it moves toward the "pressure sink" which is the well bore. Once gas is liberated, it flows preferentially to the water (i.e., relative permeability is higher for gas); thereby reducing water production rates and increasing gas production rates. It is expected that in many cases the artificial lift equipment will no longer be necessary once sufficient gas flow is established.

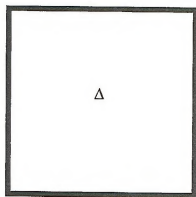
As with wildcat wells, field development well locations will be surveyed. A well spacing pattern must be established by the state, with approval of the BLM. (See Figure A-2).

Oil well spacing for production from federal leases is usually a minimum of 40 acres. Most gas well spacing for production from federal leases uses units of 160, 320, and 640 acres per well. Spacing for both oil and gas wells is based on the characteristics of the producing formation. If a field is producing from more than one formation, the surface location of the wells may be much closer than one per 40 acres. Once well spacing has been approved, development of the lease proceeds.

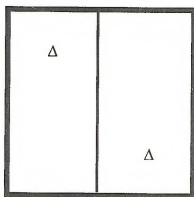
During the development stage, the road system of the area is greatly expanded. Once it is known which wells produce and their potential productive life, a permanent road system can be designed and built. Because it often takes several years to develop a field and determine field boundaries, the permanent road system is usually built in segments. Since the roads in an expanding and developing field are built in segments, many temporary roads (built initially for wildcats or development) end up as long-term (in excess of 15 years) main access or haul roads. The planning of temporary roads for wildcats and development wells is done with road conversion to long term in mind.

Since development wells have longer life spans than wildcat wells, access roads for development wells are better planned, designed, and constructed. Access roads are normally limited to one main route to serve

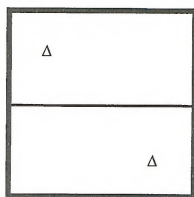
Figure A-2. Oil and Gas Spacing for a Standard 640-Acre Section. Wells must stay at least 200' inside lease boundary line. Δ Ideally spaced well.



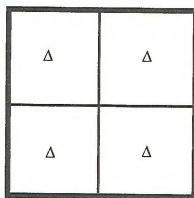
1. 640-acre spacing



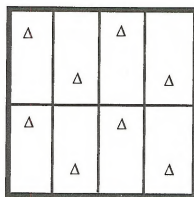
2. 320-acre spacing
("stand-up")



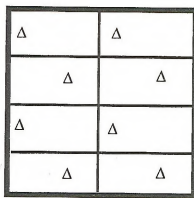
3. 320-acre spacing
("lay-down")



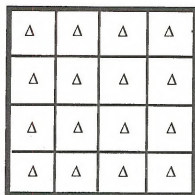
4. 160-acre spacing



5. 80-acre spacing
("stand-up")



6. 80-acre spacing
("lay-down")



7. 40-acre spacing

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the lease areas, with a maintained side road to each well. Upgrading of temporary roads may include ditching, draining, installing culverts, graveling, crowning, or capping the roadbed. The amount of surface area needed for roads would be similar to that for temporary roads mentioned earlier, and would also be dependent on topography and loads to be transported over it. Generally, main access roads are 20-to-24 feet wide and side roads are 14-to-18 feet wide. These dimensions are for the driving surface of the road and not the maximum surface disturbance associated with ditches, back cuts, or fills. The difference in disturbance is simply a matter of topography. Surface disturbance in excess of 130 feet is not unusual in steep terrain (slopes exceeding 30 percent).

When an oil field is developed on the current minimum spacing pattern of 40 acres per well, the wells are 1,320 feet apart in both north-south and east-west directions. If a section (one square mile) is developed with 16 wells, at least four miles of access roads are built. In mountainous terrain, the length of access roads may be increased since steep slopes, deep canyons, and unstable soil areas must often be circumvented in order to construct stable access to the wells.

Surface use in a gas field may be similar to an oil field (though usually less) even though the spacing of wells is usually 160 acres. Though a 160-acre spacing requires only four wells per section, the associated pipeline system often has similar initial surface requirements (acreage of surface disturbance).

In addition to roads, other surface uses for development drilling may include flowlines; storage tank batteries; facilities to separate oil, gas and water (separators and treaters); and injection wells for salt water disposal. Some of the facilities may be installed at each producing well site, and others at places situated to serve several wells. These facilities are discussed more in the following production section.

Surface use in an oil and gas field may be affected by unitization of the leaseholds. In many areas with federal lands, an exploratory unit is formed before a wildcat is drilled. The boundary of the unit is based on geologic

data. The developers unitize the field by entering into an agreement to develop and generate it as a unit, without regard to separate ownerships. Costs and benefits are allocated according to agreed terms.

Unitization reduces the surface-use requirements because all wells are operated as though on a single lease. Duplication of field processing facilities is minimized because development operations are planned and conducted by a single unit operator, often resulting in fewer wells.

The rate of development well drilling depends on whether the field is operated on an individual lease basis or unitized, the probability of profitable production, the availability of drilling equipment, protective drilling requirements (drilling requirements to protect federal land from subsurface petroleum drainage by off-setting nonfederal wells), and the degree to which limits of the field are known. The most important development rate factor may be the quantity of production. If the discovery well has a high rate of production and substantial reserves, development drilling usually proceeds at a fairly rapid pace. If there is some question whether reserves are sufficient to warrant additional wells, development drilling may occur at a much slower pace. An evaluation period to observe production performance may follow between the drilling of successive wells.

Development on an individual lease basis usually proceeds more rapidly than under unitization, since each lessee must drill his own well to obtain production from the field. On a unitized basis, however, all owners within the participating area share in a well's production regardless of whose lease the well is on. Spacing requirements are not applicable to unit wells. The unit is developed on whatever the operator considers to be the optimal spacing pattern to maximize recovery.

As mentioned earlier, drilling in an undeveloped part of a lease to prevent drainage of petroleum to an offset well on an adjoining lease (protective drilling) is frequently required in fields of intermingled federal and privately owned land. The terms of federal leases require such drilling if the

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offset well is on nonfederal lands, or on federal lands leased at a lower royalty rate.

Many fields go through several development phases. A field may be considered fully developed and produce for several years, then a well may be drilled to a deeper pay zone. Discovery of a new pay zone in an existing field is a "pool" discovery, as distinguished from a new field discovery. A pool discovery may lead to the drilling of additional wells--often from the same drilling pad as existing wells--with the boreholes separated only by feet or inches. Existing wells may also be drilled deeper.

Usually four-to-six inch diameter pipelines transport the petroleum between the well, the treating and separating facilities, and central collection points. These lines can be on the surface, buried, or elevated. Most pipelines in the Planning Areas are buried.

Trucking and pipelining are the two methods used separately or in conjunction to transport oil out of a lease or unitized area. Trucking is used to transport crude oil from small fields where installation of pipelines is not economical and the natural gas in the field is not economically marketable. It is not practical to truck natural gas.

Pipelines are the most common way to transport oil and gas. If a field has substantial amounts of natural gas, separate pipelines will be necessary for oil and gas. Pipelines move the oil from gathering stations to refineries. As existing fields increase production or new fields begin production, new pipelines may be needed. These new lines usually vary in size from four to 16 inches in diameter, and range in length from a few miles to tie into an existing pipeline, to hundreds of miles to supply a refinery. Construction of a pipeline requires excavating and hauling equipment, a temporary and/or permanent road, possibly pumping stations, clearing the right-of-way of vegetation, and possibly blasting.

Natural gas pipelines transport gas from the wells (gathering or flow lines) to a trunk line then to the main transmission line from the area. Flow lines are usually two-to-four inches in diameter and may or may not be buried. Trunk lines are generally six-to-eight inches in diameter and are buried, as are transmission lines which vary in diameter

from ten-to-36 inches. The area required to construct a pipeline varies from about 15 inches wide (for a two-to-four inch surface line) to greater than 75 feet for the larger diameter transmission lines (24-to-36 inches). Surface disturbance is primarily dependent on size of the line and topography of the area on which the line is being constructed.

Compressor stations may be necessary to increase production pressure to the same level as pipeline pressure. The stations vary in size from approximately one acre to as much as twenty acres for a very large compressor system.

Construction techniques for natural gas lines are similar to those used for oil pipelines.

Production

Production in an oil field begins just after the discovery well is completed and is usually concurrent with development operations. Temporary facilities may be used at first, but as development proceeds and reservoir limits are determined, permanent facilities are installed. The extent of such facilities is dictated by the number of producing wells, expected production, volume of gas and water produced with the oil, the number of leases, and whether the field is to be developed on a unitized basis.

The primary means of removing oil from a well in the Planning Areas is by pumping jacks (familiar horsehead devices). The pumps are powered by electric motors (power lines required) or if there is sufficient casinghead gas (natural gas produced with the pumped oil), or another gas source is available, it may be used to fuel internal combustion engines.

Some wells drilled in the area produce sufficient water that must be disposed of during the operation of the well. Although most produced waters are brackish to highly saline, some are fresh enough for beneficial use. If water is to be discharged, it must meet certain water quality standards. Because water may not come from the treating and separating facilities completely free of oil, oil skimmer pits may be established between separating facilities and surface discharge.

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Another method of disposing of wastewater is through subsurface injection. In Colorado, injection disposal wells are authorized by the Colorado Oil and Gas Conservation Commission (COGCC) under primacy of the U.S. Environmental Protection Agency. BLM engineers review the proposal for impacts to other minerals and groundwater, but have no approval authority over the well or target zone. When water is disposed of underground, it is always introduced into a formation containing water of equal or poorer quality. It may be injected into the producing zone from which it came or into other producing zones. In some cases, it could reduce the field's productivity and may be prohibited by state regulation or mutual agreement of operators. In some fields, dry holes or depleted producing wells are used for salt water disposal, but occasionally new wells are drilled for disposal purposes. Cement is squeezed between the casing and sides of the well to prevent the salt water from migrating up or down from the injection zone into other formations.

Underground oil is under pressure in practically all reservoirs. This pressure is usually transmitted to the oil through gas or water in the reservoir with the oil. When oil is pumped out of the well, pressure is reduced in the reservoir around the drill hole. This allows the gas or water in the reservoir to push more oil into the space next to the well. A reservoir that has mostly gas pushing the oil is called "gas drive," and one that has mostly water pushing the oil is called "water drive." Oil that is recovered under these natural pressures is considered primary production. Primary production accounts for about 25 percent of the oil in a reservoir.

Methods of increasing recovery from reservoirs generally involve pumping additional water or gas into the reservoir to maintain or increase the reservoir pressure. This process is called secondary recovery. Recently, the trend has been to institute secondary recovery processes very early in the development of a field. Surface disturbance from a water flooding recovery system is similar to drilling and development of an oil and gas well itself, i.e., a drill pad and access road are constructed and water pipelines may be built. Surface use is increased substantially since as many as four injection wells may be used for each oil well in the field (there are many different patterns

as well as many other methods of secondary recovery).

Tertiary recovery methods increase recovery rates by lowering the viscosity of the oil either by heating it or by injecting chemicals into the reservoir so that the oil flows more easily. Heating of reservoir oil can be accomplished by injecting steam into the reservoir. Tertiary recovery methods are not yet widely used in this area. By the year 2000, ultimate recovery (including secondary and tertiary recovery) from any given oil reservoir is expected to average 40 percent nationally.

Crude oil is usually transferred from the wells to tank storage facilities (a tank battery) before it is transported from the lease. If it contains gas and water, they are separated before the oil is stored in the tank battery. The treating and separating facilities are usually located at a storage tank battery on or near the well site.

After the oil, gas, and water are separated, the oil is piped to storage tanks located on or near the lease. There are normally at least two tanks; so that one tank can be filling as the contents of the other are measured, sold, and transported. The number and size of tanks vary with the rate of production on the lease, and with the extent of automation in gauging the volume and sampling the quality of the tank's contents.

Horizontal Drilling

The recent development of horizontal drilling holds promise of further reductions in disturbance of surface resources and values. Use of directional, horizontal, and multiple-completion drilling technology could further reduce the number of surface locations and provide greater flexibility in siting locations. These techniques will also increase production and ultimately lower costs of production. However, there are many problems with these techniques yet to be solved before they will come into wide spread use. The two most pressing of these problems in Colorado at the moment are interference with spacing patterns and the cost of the operations. Most industry experts agree that the latter will be solved through additional experience and some additional technical advances. The problem of spacing

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patterns for horizontal holes more directly involves federal and state policy.

Current spacing patterns are based on the most efficient recovery of the resource. Spacing patterns in Colorado are set by the COGCC. Spacing patterns on federal lands are also set by the COGCC, but with the concurrence of the BLM, who has the responsibility for federal lands. If the BLM and state government were to set different spacing patterns, the result would be unsolvable drainage conflicts, lost revenues, and lost resource. It could also mean the drilling of more wells than are necessary as competing companies developed reservoirs under differing jurisdictions.

In Colorado, most fields are developed on a 40, 80, 160, 320, or 640 acre pattern (see Figure A-2). Forty acres is the spacing pattern authorized for all unspaced areas. However, most new field operators apply for larger spacing based on reservoir characteristics soon after field discovery. The spacing pattern is based on the calculated area of reservoir rock which one well can drain. The calculations are based on conventional, that is vertical, wells.

Horizontal wells are drilled to the producing formation, or close to it, then proceed horizontally through the producing formation. The advantage to these wells is that much more of the reservoir rock is exposed to the bore hole, and therefore, more product may be produced through one well. In addition, more than one horizontal hole may be extended from the same vertical bore or even from the horizontal portion of the bore, thereby limiting additional surface use. Spacing patterns frequently must be adjusted to permit this type of development.

For example, a field with 40-acre spacing may have one horizontal well drilled in the northwest quarter of the northwest quarter with the horizontal portion running east all the way to the northeast quarter of the northeast quarter. This well would penetrate and produce all four of the northern tier of well spaces, thereby eliminating the need to drill three wells. The elimination of the need to drill three wells would require federal and state approval to circumvent the spacing order. Real life examples may get much more complicated than this one.

In many cases, such as the simple example given above, the oil and gas operator may have to apply for a variance to the state spacing order. Both the BLM and COGCC are committed to working with industry on these problems to take full advantage of the new technology.

Abandonment

The life span of fields varies because of the unique characteristics of any given field. Reserves, reservoir characteristics, the nature of the petroleum, subsurface geology, and political, economic, and environmental constraints all affect a field's life span from discovery to abandonment. The life of a typical field is 15 to 25 years. Abandonment of individual wells may start early in a field's life and reach a maximum when the field is depleted.

Well plugging and abandonment requirements vary with the rock formations, subsurface water, well site, and the well. In all cases, all formations bearing useable-quality water, oil, gas, or geothermal resources, and/or prospectively valuable deposits of minerals will be protected. Generally, in a dry (never produced) well, the hole below the casing is filled with heavy drilling mud, a cement plug is installed at bottom of the casing, the casing is filled with heavy mud, and a cement cap is installed on top. A pipe monument giving the location, lease number, operator, and name of the well is required unless waived by the Authorized Officer. If waived, the casing may be cut off and capped below ground level. Protection of aquifers and known oil and gas producing formations may require placement of additional cement plugs.

In some cases, wells that formerly produced are plugged as soon as they are depleted. In other cases, depleted wells are not plugged immediately but are allowed to stand idle for possible later use in a secondary recovery program. Truck-mounted equipment is used to plug former producing wells. In addition to the measures required for a dry hole, plugging of a depleted producing well requires a cement plug in the perforated section in the producing zone. If the casing is salvaged, a cement plug is put across the casing stub. The cement pumpjack foundations are removed or buried below ground level. Surface flow and injection

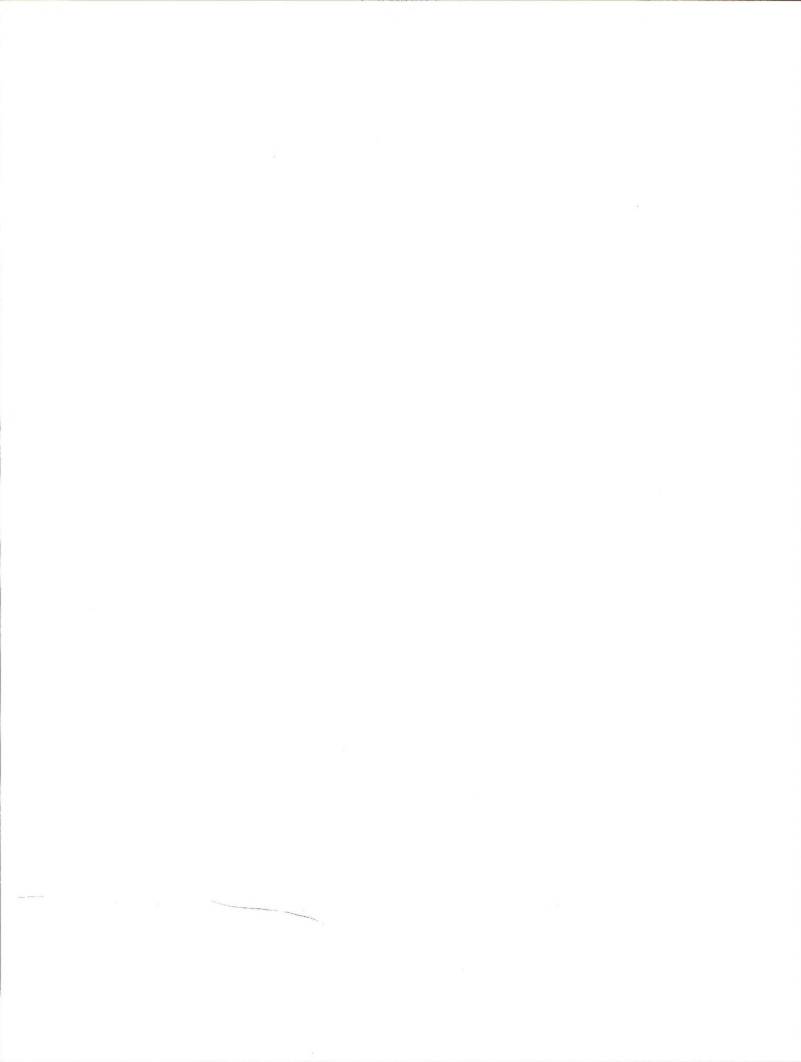
PROPOSED ACTION

lines are removed, but buried pipelines are usually left in place and plugged at intervals as a safety measure.

After plugging, the drilling rig is removed and the surface, including the reserve mud pit, is restored to the requirements of the surface management agency. This may involve the use of dozers and graders to recontour those disturbed areas associated with the drill pad plus the access road to the particular pad. The reserve pit (the part of the mud pit in which a reserve supply of drilling fluid and/or water is stored) must be evaporated or pumped dry, and filled with soil material stockpiled where the site was prepared. There will be little leakage if the pit was lined with plastic or bentonite. The area will be reshaped to a useful layout that will allow revegetation to take place, restore the landform as near as possible to its original contour, and minimize erosion. After grading the subsoil and spreading the stockpiled topsoil, the site is seeded with a grass mixture that will establish a good growth. A fence may be erected to protect the site until revegetation is complete, particularly in livestock concentration areas.

APPENDIX B

**POTENTIAL OF
DEVELOPMENT**



APPENDIX B

POTENTIAL OF DEVELOPMENT

Assumptions for the Potential of Development (POD) consist of average disturbances, projected number of wells, and total acres disturbed. The tables below display these assumptions for the five Planning Areas.

Miscellaneous acres include off-site facilities such as tank batteries, camp facilities, gathering stations, air strips, and helicopter pads.

The acreages shown in Table B-1 are derived from the following average dimensions for roads and transmission lines.

The total number of acres that will be disturbed over the life of the plan is derived by using the number of new wells forecasted and the average number of acres disturbed per well. Table B-3 displays the total estimated acreage in a disturbed condition at any time during the life of the plan. Table B-4 displays the total estimated acreage disturbed over the life of the plan (20 years).

TABLE B-1. AVERAGE DISTURBANCES PER WELL (ACRES)

	Drill Pad	Roads	Transmission Lines
Glenwood Springs	1.5	4	5.5
Kremmling	2	8	8
Little Snake	2	8	12
Northeast	2	1	0.5
San Juan/San Miguel	1.6	1.5	0.9

TABLE B-2. AVERAGE DIMENSIONS FOR ROADS AND TRANSMISSION LINES

	ROADS		TRANSMISSION LINES	
	length(mi)	width(ft)	length(mi)	width(ft)
Glenwood Springs	1	30	1	45
Kremmling	2	30	2	30
Little Snake	2	30	2	50
Northeast	0.25	30	0.25	20
San Juan/San Miguel	0.5	25	0.5	15

TABLE B-3. TOTAL ESTIMATED ACREAGE IN A DISTURBED CONDITION AT ANY TIME DURING THE LIFE OF PLAN

	Glenwood Springs	Kremmling	Little Snake	Northeast	San Juan/San Miguel
Region 1	0	0	3	0	0
Region 2	48	274	3	4	35
Region 3	95	78	203	40	264
Region 4	587	981	6,450	441	607
Misc.	0	5	13	5	1
Total	730	1,338	6,672	490	907
Reclaimed	228	492	1,990	147	272

TABLE B-4. TOTAL ACREAGE DISTURBED (20 YEARS) OVER LIFE OF PLAN

	Glenwood Springs	Kremmling	Little Snake	Northeast	San Juan/San Miguel
Region 1	0	0	57	0	0
Region 2	65	396	57	7	52
Region 3	130	108	352	70	400
Region 4	795	1,440	11,634	756	960
Misc.	100	100	250	15	18
Total	1,090	2,044	12,350	848	1,430

OIL AND GAS POTENTIAL AND REASONABLE FORESEEABLE DEVELOPMENT OF THE GLENWOOD SPRINGS RESOURCE AREA

INTRODUCTION

The Glenwood Springs Resource Area (GSRA) is situated within both the Piceance and Eagle structural basins (Figure 1). The Eagle basin is a structurally complex Pennsylvanian-age depositional basin that is located east of the southern Piceance basin (Peterson and Hite 1969). The Piceance basin is an asymmetrical kidney shaped basin that is bounded on the east by the Grand Hogback and separated from the Eagle basin by the White River uplift. The basin is deepest on the east where it is estimated to contain over 20,000 feet of Phanerozoic sediments.

PROSPECTIVELY VALUABLE FOR OIL AND GAS

Land classified as prospectively valuable (PV) for oil and gas is based on criteria described in Appendix 1. PV lands for oil and gas in the GSRA are shown in Figure 2 and generally include lands that have a minimum of 1,000 feet of sedimentary rock, favorable structural setting, and minimum evidence of potential for the occurrence of oil and gas. Areas not designated as PV are rated as having no potential.

OIL AND GAS POTENTIAL

Oil and gas potential rating criteria are described in Appendix 2 and are the basis for the ratings described below. In general, areas defined by the U.S. Geological Survey (USGS) as a play have a high potential for oil and gas.

Eagle Basin

The Eagle Basin is stratigraphically similar to the Paradox basin of the four-corners region to the southwest. However, the oil and gas potential is quite different when the tectonic and thermal histories are compared (Spencer and Wilson 1988). The oil potential is considered to be low based on the paleogeothermal and oil generation studies conducted by Nuccio and Schenk (1986). They found that most of the Paleozoic rocks

within the basin have a very high thermal maturity and concluded that oil generated would have been either escaped or be found in late Paleozoic or Jurassic reservoirs. That information, coupled with the basin stratigraphy and structure, lack of large areas of younger source rocks, and drilling history are the basis for the moderate potential rating.

Piceance Basin

Two conventional and two unconventional gas plays are present within the Piceance basin portion of the GSRA. The conventional plays are the Uinta-Piceance Upper Cretaceous and Uinta-Piceance Tertiary gas plays, while the unconventional gas plays are Piceance basin tight gas sands and Cretaceous coal bed methane (Figures 3-6).

Figure 3 is an oil and gas potential map for the conventional Upper Cretaceous gas play. As can be seen, the entire Piceance basin portion, from the Grand Hogback west, has a high potential; while the remainder of the Resource Area has no potential.

The conventional Tertiary gas play is illustrated in Figure 4. High potential occurs within the play boundary. A moderate potential is assigned to those lands within the Piceance basin defined by the contact between the Wasatch Formation and underlying Mesaverde Group. The remainder of the Resource Area has no potential owing to the absence of Tertiary Wasatch sediments.

The area designed by the Federal Energy Regulatory Commission eligible for tight gas production price incentives is shown in Figure 5. This designation is for gas produced from the lower Mesaverde Group marginal-marine sandstone. This area has a high potential, while the remainder of the Piceance basin within the Resource Area has a moderate potential.

Coal bed methane resources of the southern Piceance basin has been studied extensively (Choate, Jurich, and Saulnier 1984; Johnson and Nuccio 1986; Rightmire and Choate 1986). Areas rated as having low through high potentials for coal bed methane production are shown in Figure 6. The remainder of the Resource Area is rated as having no potential (Figure 7). The low

APPENDIX B

through high potential area is based on criteria developed by Choate, Jurich, and Saulnier (1986), and is described in their article.

OIL AND GAS ACTIVITY

Historical Background:

Several dry holes were drilled in the Resource Area prior to the 1950s, however, gas exploration and development accelerated through the 1950s, peaked during 1959 through 1961, 1980 through 1982, and again in 1985 to the present (Table 1; Figure 8). The present activity is due to Barrett Resources Company's exploration and development of the Parachute and Grand Valley fields in Garfield County.

All production has been from nine fields (Figure 9), in the Piceance basin from reservoirs in the Upper Cretaceous Mesaverde Group and the Tertiary Wasatch Formation. Production has been continuous since 1956 with the discovery of gas in both the Divide Creek and Rulison fields. Table 2 illustrates development wells and wildcat wells completed on BLM, U.S. Forest Service (USFS), and Fee/State lands. This table shows that approximately 18 percent of wells have been drilled on BLM lands, 18 percent of wells on the National Forests, and 64 percent on nonfederal lands.

Cumulative production of all the fields, through 1987, has been 16,074 barrels of oil (BO) and 80,497,787 thousand cubic feet (MCF) of gas (Table 3). During the same period, cumulative production from federal wells has been 1,285 BO and 3,921,341 MCF of gas (Table 4). Production from federal lands represents about 4.9 percent of the total production from the Resource Area.

Exploratory drilling in the Eagle Basin has resulted in 13 dry holes since 1947 with the last well abandoned in 1980.

PRESENT ACTIVITY

Exploration and development activity has generally declined from the high in 1980-1981 for conventional reservoirs. However, tax incentives for the development of coal-bed methane has resulted in maintaining a fairly high level of overall activity.

Reasonably Foreseeable Development Activity:

Historical trends, USGS estimates, present activity, and professional judgment were the key ingredients in formulating the reasonably foreseeable development scenario for oil and gas activity in the GSRA.

Spacing units for gas wells are set by the Colorado Oil and Gas Conservation Commission (COGCC). While the BLM is not bound by their spacing unit sizes, they are usually recognized. Within the Resource Area, Tertiary Wasatch gas wells are usually spaced on 160 acres and the Mesaverde gas wells are spaced on 320 to 640 acre units.

The U.S. Geological Survey (Spencer and Wilson 1988) estimated the number of gas fields not yet discovered in the Uinta-Piceance Tertiary and Uinta-Piceance Upper Cretaceous conventional gas plays at 5 percent and 95 percent probability confidence limits (Table 5). These estimates are for the discovery of fields having a recoverable reserve of 6 billion cubic feet of gas (BCF). Since that portion of the Resource Area within the Uinta-Piceance gas play area is less than 10 percent, an estimate of the number of fields that may be discovered is a best guess estimate.

A six BCF gas field in the Wasatch, which is spaced in 160-acre units and has an average recoverable reserve of .75 BCFG would require eight wells and 1,280 acres. A Mesaverde well, on the other hand, is generally spaced on 320- to 640-acre units and has recoverable reserves of one to two BCFG. A six BCFG field producing from the Mesaverde would vary in size from 960 acres to 3,840 acres with three to 12 wells respectively.

Based on the USGS estimates, the above data translates to one to three Wasatch and three to six Upper Cretaceous Mesaverde fields yet to be discovered. At a minimum it would be expected, at a success rate of 75 percent that 11 to 33 wells would be drilled to discover and develop one to three Wasatch fields, and 12 to 96 wells to develop three to six Mesaverde fields.

With the distribution of BLM lands, present field development, and 18 percent of the wells drilled on BLM lands, approximately

POTENTIAL OF DEVELOPMENT

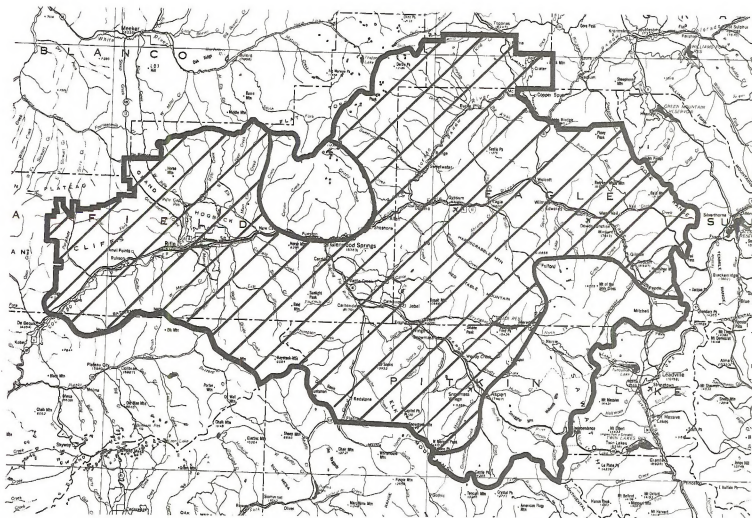
five to 24 wells projected to be drilled on BLM lands to develop the four to nine fields of minimum size. This probably represents a conservative estimate, considering Barrett's plans for development of Wasatch and Mesaverde gas. If Barrett were to follow through with its plans to drill 200 wells in the continued development of the Grand Valley and Parachute fields, as well as explore the Mobil leases, it would result in approximately 36 wells drilled on BLM lands.

Forecasting Activity Based on Historical Trends

Since 1950, a total of 253 wells have been completed within the Piceance Basin of the Resource Area. Future oil and gas activity is difficult to predict, however, a sudden increase in the demand for gas or an increase in price could trigger a large exploration and development program throughout the Piceance Basin very rapidly. Evaluation of past activity and professional judgment indicates that it is reasonable to expect at least one cycle of increased drilling activity during the next 20 years.

Trend analysis and statistical forecasting based on historical activity indicate approximately 300 wells will be completed during the period 1989 through 2010. This includes both wildcat and development wells in the Piceance Basin. Of those, 54 or 18 percent are expected to be drilled on BLM lands.

It seems reasonable to expect up to 36 wells to be drilled within the Tertiary conventional gas and Upper Cretaceous conventional gas plays, with an additional 18 wells drilled outside of the play areas on BLM lands.



GLENWOOD SPRINGS RESOURCE AREA

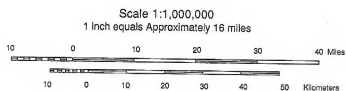
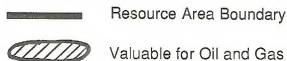
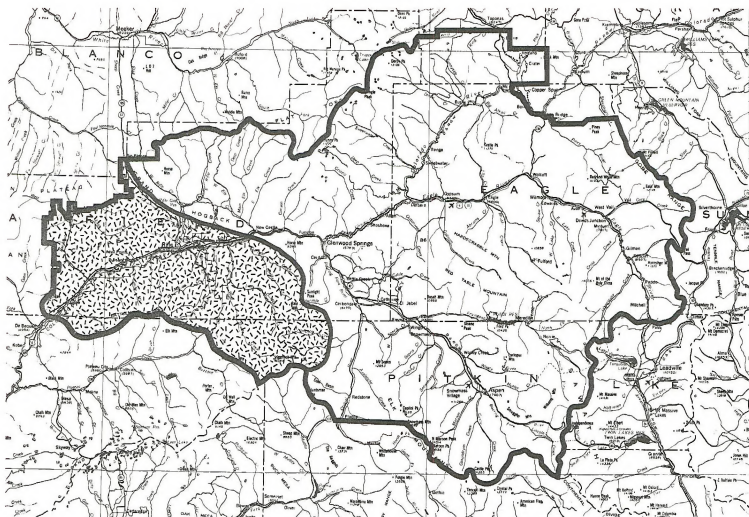


Figure 2 Prospectively Valuable Lands



GLENWOOD SPRINGS RESOURCE AREA

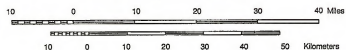


Resource Area Boundary

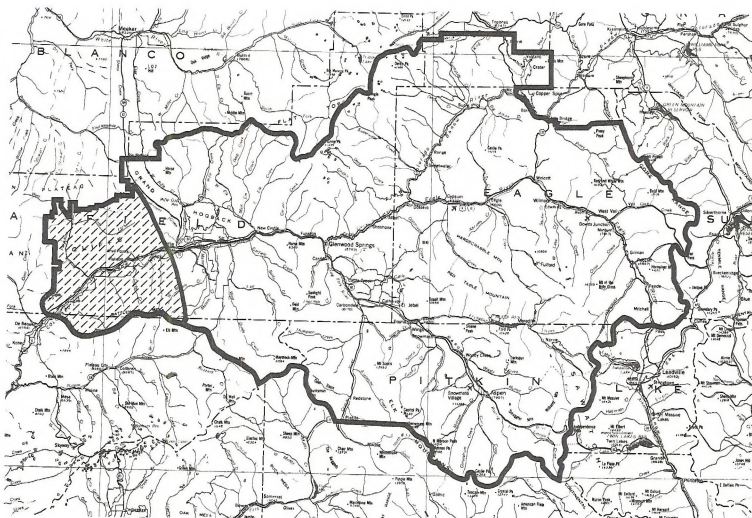


Play

Scale 1:1,000,000
1 inch equals Approximately 16 miles



**Figure 3 Uinta-Piceance Basin Upper Cretaceous
Conventional Gas Play**



GLENWOOD SPRINGS RESOURCE AREA

Resource Area Boundary



Play

Scale 1:1,000,000
1 inch equals Approximately 16 miles

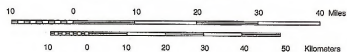


Figure 4 Uinta-Piceance Basin Tertiary
Conventional Gas Play

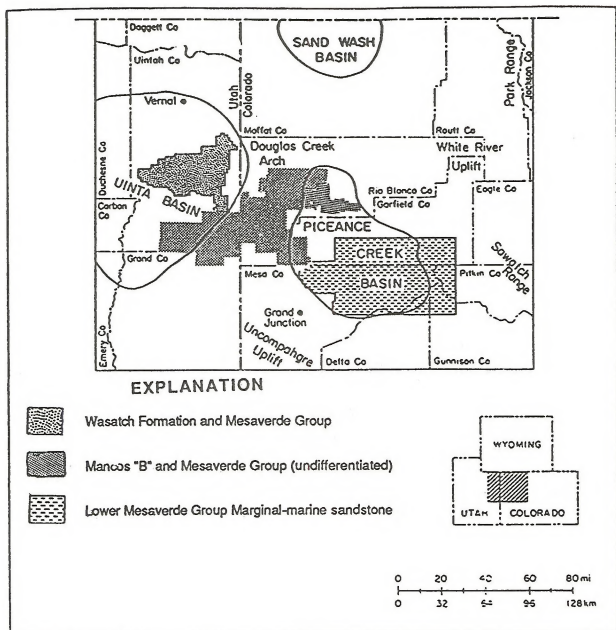


Figure 5.--Areas in the Uinta and Piceance basins designated as eligible for receiving tight gas production incentive prices by the Federal Energy Regulatory Commission (Modified from Finley, 1984, his fig. 74).

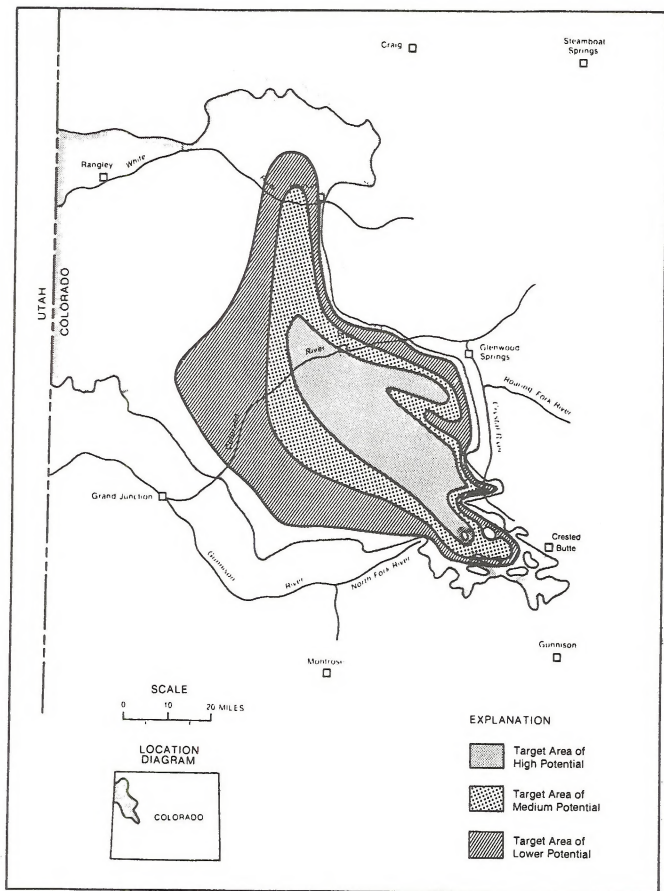
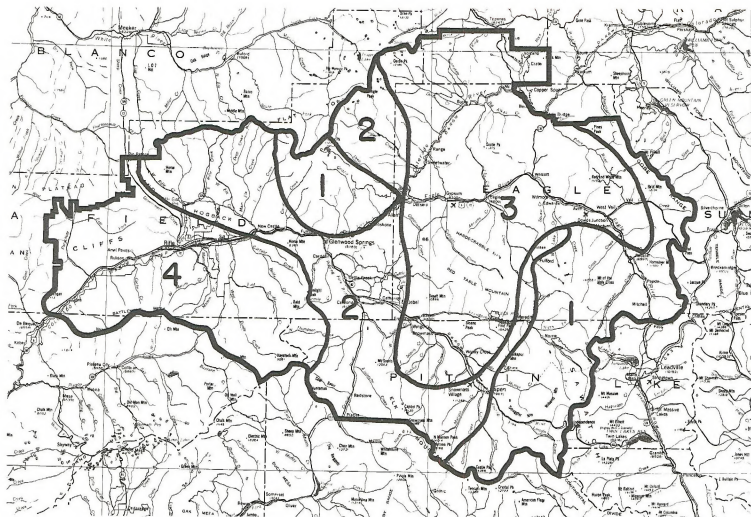


Figure 6 —Piceance Basin coalbed methane target area.



GLENWOOD SPRINGS RESOURCE AREA

Resource Area Boundary

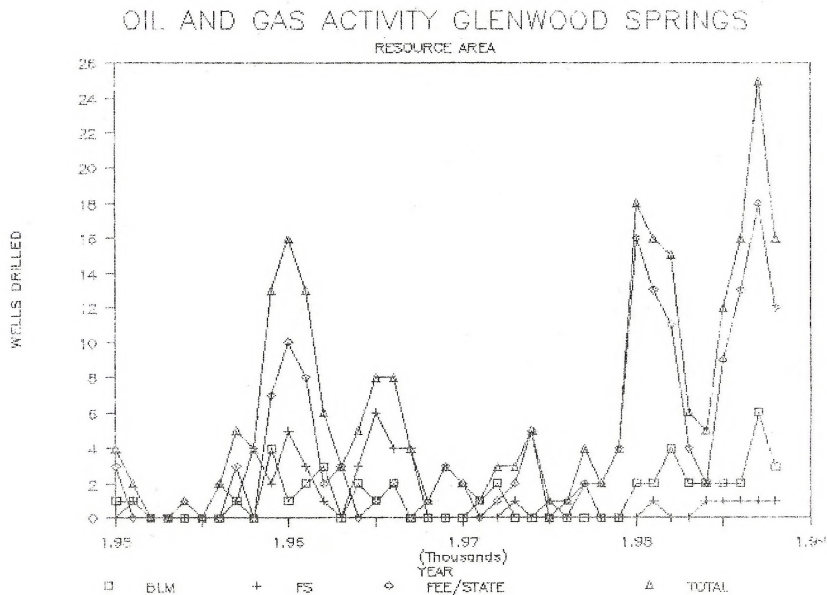
- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High

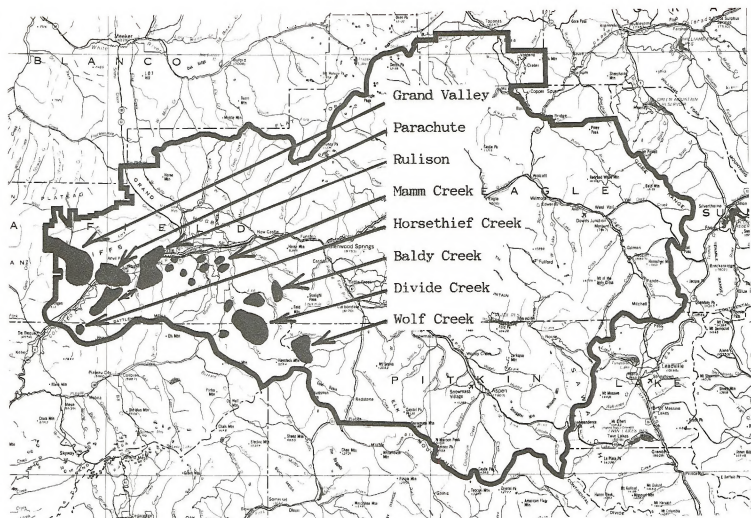
Scale 1:1,000,000
1 inch equals Approximately 16 miles



Figure 7 Oil and Gas Potential

Figure 8. Graph of oil and gas activity
by mineral ownership.





GLENWOOD SPRINGS RESOURCE AREA

Figure 9 Oil and Gas Fields

TABLE 1. GLENWOOD SPRINGS OIL AND GAS DRILLING HISTORY
(1950 - 1988)

YEAR	BLM		BLM T		FS		FS T		FED		FED T		FEE		FEE T		TOTAL		S T
	D&A	PWR	D&A	PWR	D&A	PWR	D&A	PWR	D&A	PWR	D&A	PWR	D&A	PWR	D&A	PWR	D&A	PWR	T
1950	1	0	1	0	0	0	1	0	1	3	0	3	4	0	4				
1951	1	0	1	1	0	1	2	0	2	0	0	2	0	0	2	0	2		
1952	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1953	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1954	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1			
1955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1956	0	0	0	0	2	2	0	2	2	0	0	0	0	0	0	2	2		
1957	0	1	1	0	1	1	0	2	2	1	2	3	1	4	5				
1958	0	0	0	0	4	4	0	4	4	0	0	0	0	0	4	4			
1959	0	4	4	0	2	2	0	6	6	1	6	7	1	12	13				
1960	0	1	1	0	5	5	0	6	6	4	6	10	4	12	16				
1961	0	2	2	3	0	3	3	2	5	3	8	8	5	13					
1962	1	2	3	0	1	1	1	3	4	2	0	2	3	6					
1963	0	0	0	0	0	0	0	0	0	2	1	3	2	1	3				
1964	2	0	2	1	2	3	3	2	5	0	0	0	3	2	5				
1965	1	0	1	1	5	6	2	5	7	0	1	1	2	6	8				
1966	0	2	2	2	2	4	2	4	6	1	1	2	3	5	8				
1967	0	0	0	1	3	4	1	3	4	0	0	0	1	3	4				
1968	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1				
1969	0	0	0	0	0	0	0	0	0	3	0	3	3	0	3				
1970	0	0	0	0	0	0	0	0	0	2	0	2	2	0	2				
1971	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1				
1972	1	1	2	0	0	0	1	1	2	0	1	1	1	1	2	3			
1973	0	0	0	1	0	1	1	0	1	1	1	2	2	1	3				
1974	0	0	0	0	0	0	0	0	0	1	4	5	1	4	5				
1975	0	0	0	0	1	1	0	1	1	0	0	0	0	0	1	1			
1976	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1				
1977	0	0	0	2	0	2	2	0	2	1	1	2	3	1	4				
1978	0	0	0	0	0	0	0	0	0	1	1	2	1	1	2				
1979	0	0	0	0	0	0	0	0	0	1	3	4	1	3	4				
1980	0	2	2	0	0	0	0	2	2	0	16	16	0	18	18				
1981	0	2	2	1	0	1	1	2	3	0	13	13	1	15	16				
1982	1	3	4	0	0	0	1	3	4	1	10	11	2	13	15				
1983	0	2	2	0	0	0	0	2	2	2	4	6	2	4	6				
1984	0	2	2	0	1	1	0	3	3	2	0	2	2	3	5				
1985	0	2	2	0	1	1	0	3	3	2	7	9	2	10	12				
1986	0	2	2	0	1	1	0	3	3	1	12	13	1	15	16				
1987	0	6	6	0	1	1	0	7	7	0	18	18	0	25	25				
1988	0	3	3	1	0	1	1	3	4	1	11	12	2	14	16				

Totals==> 9 37 46 14 32 46 23 69 92 39 122 161 62 191 253

TABLE 2. FIELD WELL SUMMARY FOR GLENWOOD SPRINGS RESOURCE AREA
(includes Grand Valley Field wells in GWRA)

FIELD	FB		BLM		FEE/STATE		TOTAL		TOTAL SUCCESS %	
	D&A	PWR/SI	D&A	PWR/SI	D&A	PWR/SI	D&A	PWR/SI		
Baldy Creek	0	0	0	1	0	1	0	2	2	100.00%
Divide Creek	2	23	0	1	3	3	5	27	32	94.38%
Hells Gulch	0	0	0	1	0	0	0	1	1	100.00%
Horse Thief Creek	0	0	1	0	1	1	2	1	3	33.33%
Grand Valley	0	0	0	7	0	9	0	16	16	100.00%
Nm Creek	0	0	0	0	1	3	1	3	4	75.00%
Parachute	0	0	0	2	0	27	0	29	29	100.00%
Rulison	0	0	0	18	7	57	7	75	82	91.46%
Wolf Creek	5	9	0	0	0	0	5	9	14	64.29%
Wildcat	4	4	7	10	29	23	40	37	77	48.05%
TOTALS(*****>)	11	36	8	40	41	124	60	200	260	76.92%

TABLE 3. CUMULATIVE PRODUCTION
(TO 1-1-88)
FOR OIL AND GAS FIELDS
GLENWOOD SPRINGS RESOURCE AREA

FIELD	FORMATION	SIM	PRW	1987		TOTAL	
				CUM OIL (Bbls)	CUM GAS (Mcf)	CUM OIL (Bbls)	CUM GAS (Mcf)
Baldy Creek	Mesaverde	0	3	0	47,037	0	432,789
Divide Creek	Mesaverde	8	3	0	138,336	0	49,842,793
Grand Valley	Mesaverde	1	11	263	382,004	487	526,190
Hells Gulch	Mesaverde	0	0	0	0	0	130,397
Horsethief Creek	Mesaverde	0	0	0	0	0	141,282
Mam Creek	Mesaverde	1	0	102	15,746	545	886,331
Parachute	Wasatch	0	30	112	740,228	112	1,327,499
Rulison	Wasatch	6	28	0	584,776	32	6,740,252
	Mesaverde	10	14	1,268	365,303	14,898	7,820,432
Wolf Creek	Mesaverde	0	0	0	0	0	12,629,852
TOTALS=====>		26	99	1,745	2,273,437	16,074	80,497,787

TABLE 4. CUMULATIVE PRODUCTION
(TO 1-1-88)
FOR FEDERAL WELLS
GLENWOOD SPRINGS RESOURCE AREA

FIELD	FORMATION	SIM	PRW	FE 1987		TOTAL		% FED.
				CUM OIL (Bbls)	CUM GAS (Mcf)	CUM OIL (Bbls)	CUM GAS (Mcf)	
Baldy Creek	Mesaverde	0	1	0	17,341	0	17341	4.01%
Divide Creek	Mesaverde	0	1	0	20,970	0	176130	0.35%
Grand Valley	Mesaverde	1	5	263	244,193	480	379610	72.14%
Hells Gulch	Mesaverde	0	0	0	4,763	0	150,397	100.00%
Horsethief Creek	Mesaverde	0	0	0	0	0	0	0.00%
Mam Creek	Mesaverde	0	0	0	0	0	0	0.00%
Parachute	Wasatch	0	2	0	4,763	0	4763	0.36%
Rulison	Wasatch	1	4	0	47,133	0	616741	9.15%
	Mesaverde	3	1	88	67,190	805	2376359	33.94%
Wolf Creek	Mesaverde	0	0	0	0	9	0	0.00%
TOTALS=====>		5	14	351	406,353	1,285	3,921,341	

PERCENT FEDERAL==> 20.11% 17.87% 7.94% 4.87%

TABLE 5. U. S. GEOLOGICAL SURVEY GAS FIELD DISCOVERY
PROBABILITY TABLE (FIELDS > 6 BCFG)

PLAY -----	0.95 -----	0.05 -----
Uinta-Piceeance Tertiary Gas	9	35
Uinta-Piceeance upper Cretaceous	25	55

POTENTIAL FOR OCCURRENCE AND DEVELOPMENT OF OIL AND GAS IN THE KREMMLING RESOURCE AREA

INTRODUCTION

The Kremmling Resource Area (KRA) is located within the Colorado Park Basin Province in North-Central Colorado and encompasses both the North Park and Middle Park Structure Basins. Both basins are essentially a single structural basin that is separated by Tertiary volcanoclastic and flow rocks of the east-west-trending Rabbit Ears Range. A detailed description of the geology of the basins can be found in Maughan's (1988) Open-File Report on the geology and petroleum potential of the province.

Hydrocarbon Occurrence

Oil and gas were first discovered in 1926 by Continental Oil Company in northeastern Jackson County. This discovery opened the North McCallum Field and consisted of gas, composed of 96 percent CO₂ and 4 percent hydrocarbons from the Cretaceous Dakota Sandstone.

It was not until 1952 that oil was discovered in the Coalmont area from fractures in Dakota shales. Since that time, 13 fields have been discovered and developed, all in North Park (Figure 1). During 1987, a total of 101 wells produced 233,351 BO and 292,098 MCFG, while 27 wells produced 1,128,761 MCF of CO₂.

No commercial hydrocarbons have been produced from the Middle Park Basin. However, the Granby Anticline (T.2-3 N., R. 76-77 W.), just north of the town of Granby, tested significant gas shows in the Niobrara and Muddy-Dakota interval in 1953 by British American.

Three subsequent wells had shows of gas, but also revealed the highly complex structure of the anticline (Wellborn 1977).

PROSPECTIVELY AVAILABLE FOR OIL AND GAS

The majority of the lands within the Resource Area are classified as prospectively valuable (PV) for oil and gas (Figure 2). Appendix 1 details the criteria for PV classifications.

Recent structural interpretations of the North Park Basin suggest that the PV classification needs to be revised. This is particularly evident at the northern terminus of the basin where Independence Mountain has been overthrust the Paleozoic and Mesozoic Section (Park 1977; Wellborn 1977).

OIL AND GAS POTENTIAL

Oil and gas potential rating criteria are described in Appendix 2 and is the basis for the ratings described below for both the North Park and Middle Park Basins. In general, areas defined by the U.S. Geological Survey (USGS) as a play have a high potential for oil and gas, while lands not classified as PV have no potential.

Maughan (1988) describes two major plays that occur within the Resource Area. The first, upper Jurassic and lower Cretaceous structural play includes all of North Park and Middle Park Basins containing reservoirs and potential reservoirs within rocks of those ages. Reservoirs within that play are typically developed in combination traps. The fields occur within structural closure or entrapment against or adjacent to northwest-southeast trending faults and folds (Figure 3).

The second play is a hydrocarbon subthrust play that includes lands not classified as PV, due to the presence of Precambrian crystalline rocks on the surface. Several areas of outcropping Precambrian rocks actually are overthrusts and are represented by the Sheep Mountain, Independence Mountain Vasquez, Never Summer, and Williams Range thrust faults. Maughan concluded that the sedimentary rocks and structure of North Park extend northward underneath (12 miles) the Independence Mountain overthrust, and therefore, have the same oil and gas potential. The other overthrusts mentioned above occur along the eastern margin of the basins, and are probably limited in their overthrusting when compared to the Independence Mountain thrust, but are geologically similar (Figure 4).

Oil and gas potential for the Resource Area is shown in Figure 5. As can be seen the majority of the area is high potential based on the subthrust play and Jurassic and Lower Cretaceous structural plays defined by the

APPENDIX B

USGS. Areas outside of these two plays have no potential.

OIL AND GAS ACTIVITY

Historical Background

Approximately 50 percent of the wells drilled in the Resource Area were completed as dry holes (Table 1). Figure 6 illustrates the drilling history for 1926 through 1988. Drilling activity has peaked during four periods with the greatest activity starting in the early 1970s and continuing into the early 1980s.

All production has been from 13 fields (Figure 1), in North Park from porous sandstone reservoirs of the Entrada Sandstone, Morrison Formation, Dakota Sandstones (Lakota, Dakota, and Muddy Sandstones), Codell Sandstone, and Pierre Shale. Production also occurs from fractured shale reservoirs in the Niobrara Formation.

Table 2 illustrates development and wildcat wells completed on BLM, U.S. Forest Service (USFS), and Fee/State lands. This table shows that approximately 58 percent of the development and 32 percent of the wildcat wells were completed on BLM lands, while no development wells and 7 percent of the wildcat wells were completed within National Forest lands.

Cumulative production of all the fields, through 1987, has been 14,962,306 BO and 9,690,708 MCFG, as well as 666,846,756 MCF of CO₂ produced from the McCallum Fields (Table 3). During the same period, cumulative production from federal wells has been 9,122,682 BO and 662,701 MCFG, and 659,721,551 MCF of CO₂ (Table 4). Federal production accounts for approximately 61 percent of oil produced, 7 percent of gas, and 99 percent of the CO₂.

Exploratory drilling in the Middle Park Basin has not resulted in any commercial production.

PRESENT ACTIVITY

Exploration and development activity has declined from a total of 48 wells drilled during the last peak of activity in 1984 to two in 1988. Development drilling in the McCallum and Canadian River Fields

accounted for 90 percent of the activity. The decrease in activity is due to market conditions resulting from the collapse of oil prices.

REASONABLY FORESEEABLE DEVELOPMENT ACTIVITY

Historical trends, USGS estimates, present activity, and professional judgment were the key ingredients in formulating the reasonably foreseeable development scenario for oil and gas activity in KRA.

While the USGS (Maughan 1988) has not estimated the number of fields yet to be discovered, there is an estimate of undiscovered recoverable oil and gas within the basin. At a 95 percent confidence level (probability), only negligible oil and 10 million MCFG are estimated as undiscovered recoverable. The volume increases to 30 million BO and 50 million MCFG at 5 percent probability, with a mean of 10 million BO and 20 million MCFG. The mean probability estimate translates to doubling the number of development wells completed to date.

Field size, based on 40-acre spacing units, varies from 40 to 3,000 acres. The largest fields are McCallum, McCallum-North, and Canadian River. Doubling of recoverable reserves would probably double the productive acreage, or an increase of approximately 8,400 acres.

Forecasting Activity Based on Historical Trends

Since 1926, a total of 466 wells have been completed within the Resource Area. Future oil and gas activity is difficult to predict; however, a sudden increase in the demand for oil and gas or price increases could trigger a larger exploration and development program. Evaluation of past activity and professional judgment indicates that it is reasonable to expect at least one cycle of increased drilling activity during the next 20 years.

Trend analysis and statistical forecasting based on historical activity indicate that 225 wells are forecast to be drilled within the Resource Area. This forecast is based on the following assumptions:

POTENTIAL OF DEVELOPMENT

- Best fit, statistically with lowest mean squared error.
- 62 percent of wells forecast are development and 38 percent wildcat.
- 57 percent of development and 32 percent of wildcat wells are drilled on BLM.
- 78 percent success rate for development and 7 percent success rate of wildcat wells drilled on BLM.

Of the 225 wells forecast, 80 development and 28 wildcat wells will be drilled on BLM lands. Sixty-two of the development wells are expected to be completed for production in the upper Jurassic and lower Cretaceous structural play of North Park Basin. Only 28 percent of the wildcat wells have been drilled in Middle Park, with 18 percent drilled on BLM lands. Based on these statistics, two wells are expected to be drilled in Middle Park upper Jurassic and lower Cretaceous structural play. The remaining 20 wildcat wells will be drilled in North Park. Four wells will be drilled on BLM lands on the subthrust play (Independence Mountain overthrust) and the remaining 16 within the upper Jurassic and lower Cretaceous structural play.

The development and exploratory drilling is expected to be concentrated in the McCallum, Sheep Mountain-Delaney Butte, and Coalmont areas. Exploration in Middle Park will be in the Granby area, with one or two wells drilled in the Blue River Valley area (Figure 7).

As previously discussed, based on the USGS estimates of undiscovered reserves, the above estimate would be doubled.

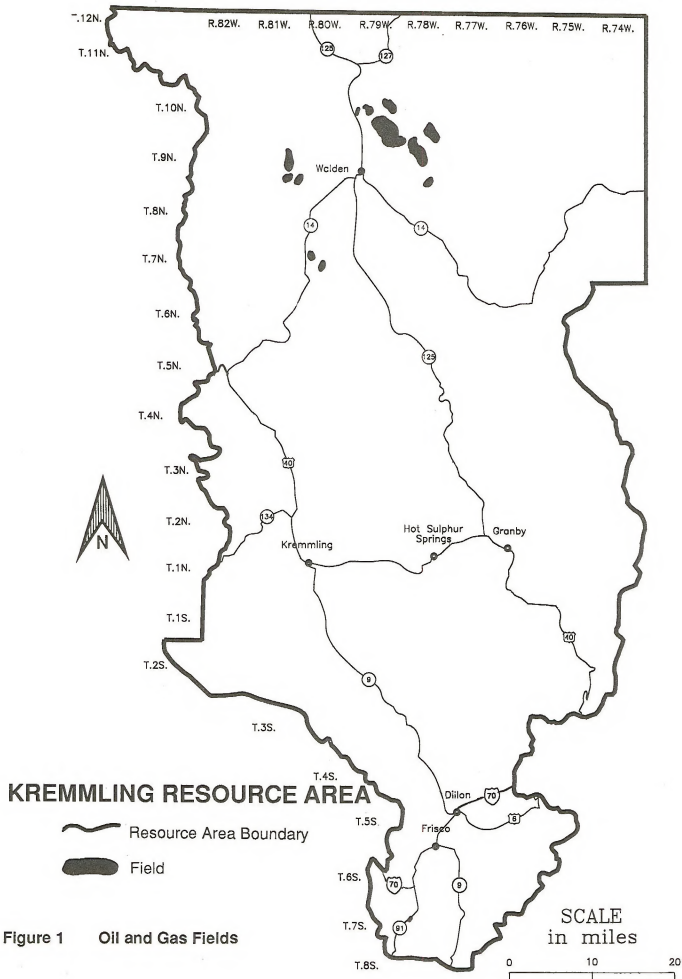
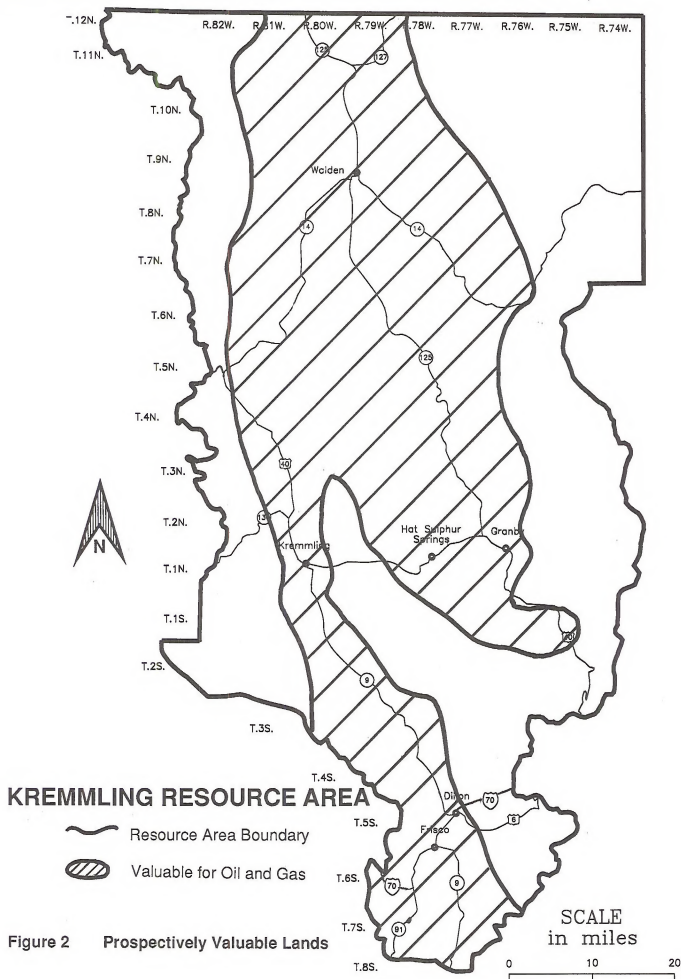


Figure 1 Oil and Gas Fields



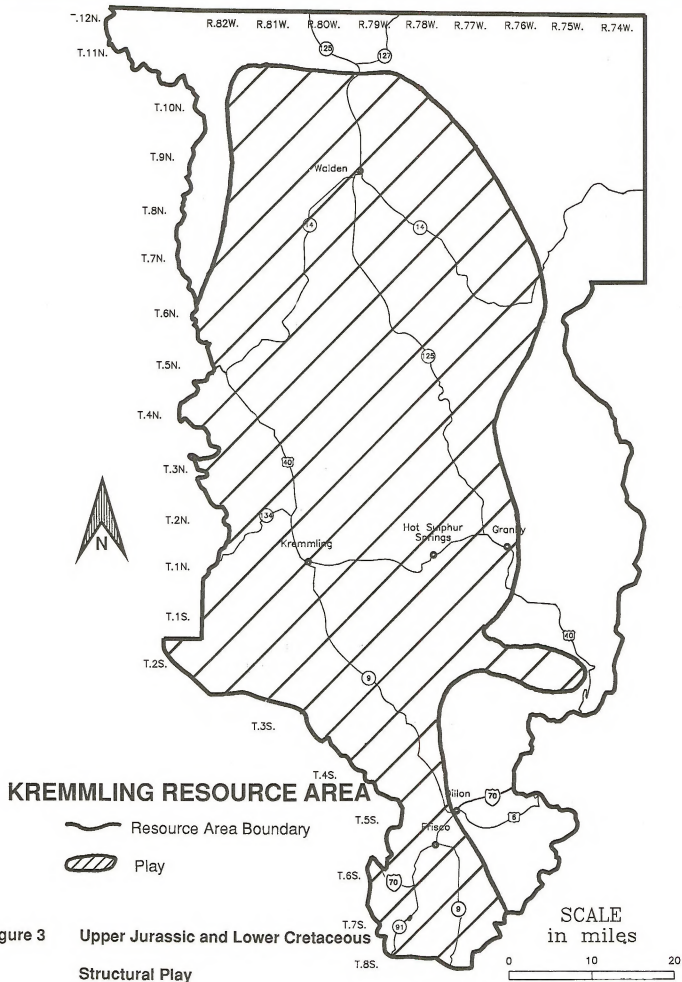


Figure 3 Upper Jurassic and Lower Cretaceous
Structural Play

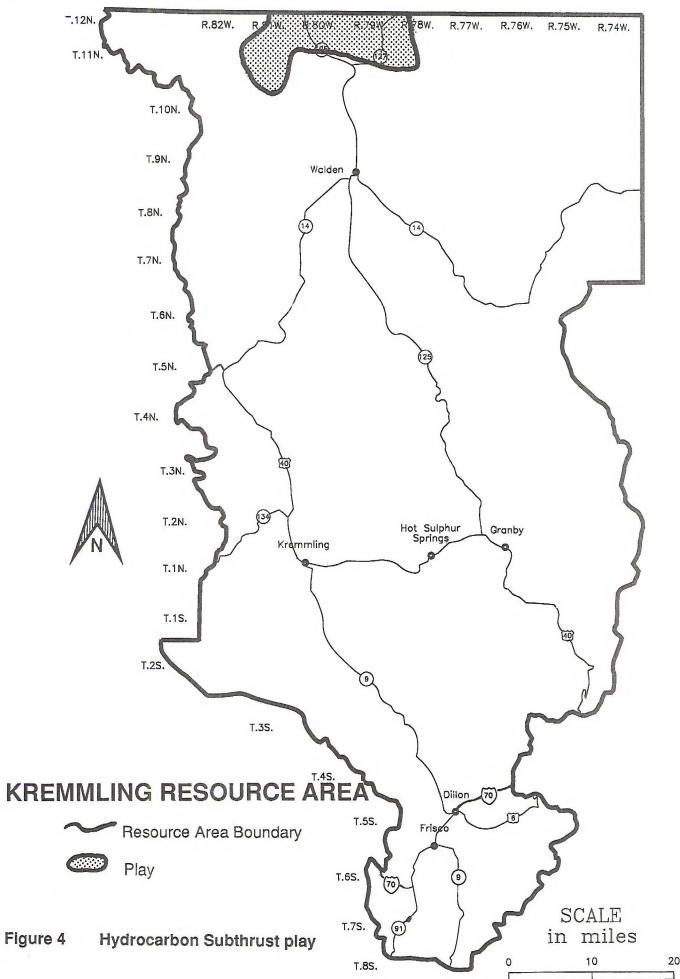


Figure 4 Hydrocarbon Subthrust play

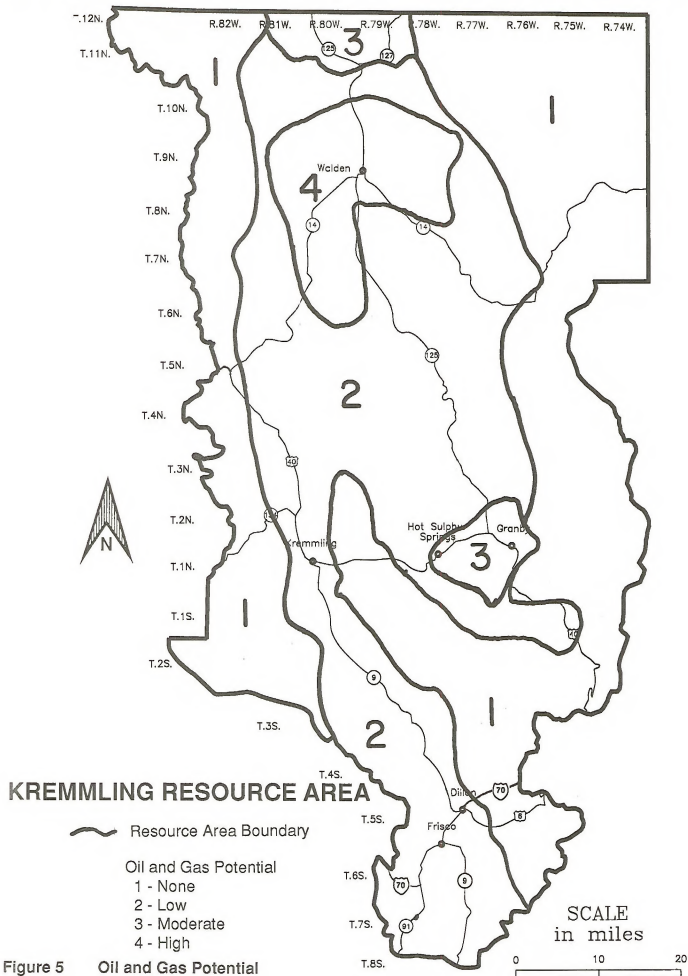


Figure 5 Oil and Gas Potential

KREMMLING RESOURCE AREA

OIL AND GAS ACTIVITY

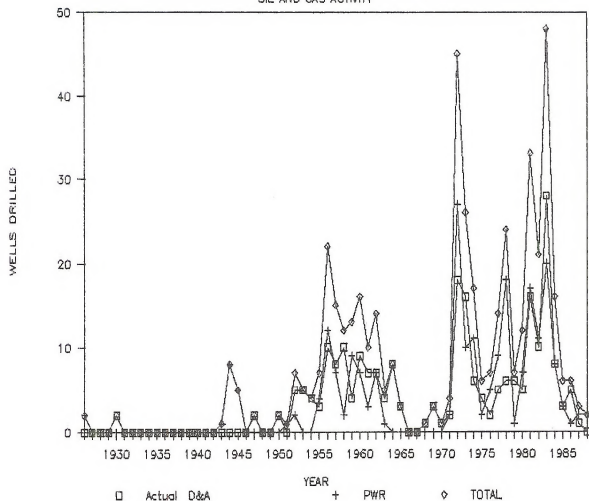


Figure 6. Oil and gas drilling activity graph for the Kremmling Resource Area.

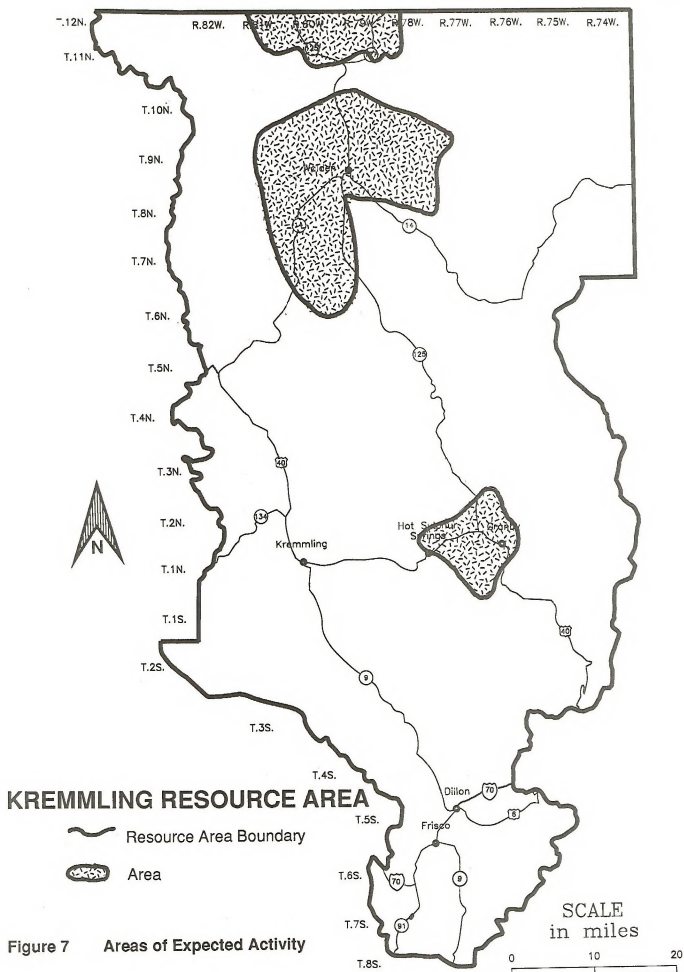


Figure 7 Areas of Expected Activity

TABLE 1. OIL AND GAS ACTIVITY IN THE KREMLING RESOURCE AREA

YEAR	BLH			FS			FEE/ST			D&A		
	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL
1926			1			0			1	0	2	2
1927			0			0			0	0	0	0
1928			0			0			0	0	0	0
1929			0			0			0	0	0	0
1930			0			0	2		2	2	0	2
1931			0			0			0	0	0	0
1932			0			0			0	0	0	0
1933			0			0			0	0	0	0
1934			0			0			0	0	0	0
1935			0			0			0	0	0	0
1936			0			0			0	0	0	0
1937			0			0			0	0	0	0
1938			0			0			0	0	0	0
1939			0			0			0	0	0	0
1940			0			0			0	0	0	0
1941			0			0			0	0	0	0
1942			0			0			0	0	1	1
1943	0	1	1			0			0	0	8	8
1944	0	5	5			0	0	3	3	0	5	5
1945	0	5	5			0			0	0	0	0
1946			0			0			0	0	0	0
1947	1	0	1			0	1		1	2	0	2
1948			0			0			0	0	0	0
1949			0			0			0	0	0	0
1950			0			0	2	0	2	2	0	2
1951	0	1	1			0	0	0	0	0	1	1
1952	2	1	3			0	3	1	4	5	2	7
1953	1	0	1			0	4	0	4	5	0	5
1954	1	0	1			0	3	0	3	4	0	4
1955	1	0	1			0	2	4	6	3	4	7
1956	2	2	4			0	8	10	18	10	12	22
1957	1	3	4	1	0	1	6	4	10	8	7	15
1958	5	2	7			0	5	0	5	10	2	12
1959	3	6	9	1	0	1	0	3	3	4	9	13
1960	3	6	9			0	6	1	7	9	7	16
1961	3	2	5			0	4	1	5	7	3	10
1962	4	7	11	1	0	1	2	0	2	7	7	14
1963	3	1	4			0	1	0	1	4	1	5
1964	3	0	3			0	5	0	5	8	0	8
1965			0			0	3	0	3	3	0	3
1966			0			0			0	0	0	0
1967			0			0			0	1	0	1
1968			0	1	0	1			0	1	0	1
1969			0			0	3	0	3	3	0	3
1970			0			0	1	0	1	1	0	1
1971	2	1	3			0	0	1	1	2	2	4
1972	13	20	33			0	5	7	12	18	27	45
1973	8	2	10	1	0	1	7	8	15	16	10	26
1974	4	9	13	1	0	1	1	2	3	6	11	17
1975	3	0	3			0	1	2	3	4	2	6
1976	1	0	1	1	0	1	0	5	5	2	5	7
1977	1	6	7			0	4	3	7	5	9	14
1978	3	16	19	1	0	1	2	2	4	6	18	24
1979	1	1	2	1	0	1	4	0	4	6	1	7
1980	0	1	1			0	5	6	11	5	7	12
1981	2	8	10	2	0	2	12	9	21	16	17	33
1982	0	5	5	1	0	1	9	6	15	10	11	21
1983	8	10	18			0	20	10	30	28	20	48
1984	6	7	13	1	0	1	1	1	2	8	8	16
1985	2	2	4			0	1	1	2	3	3	6
1986	2	1	3			0	3	0	3	5	1	6
1987	0	1	1			0	1	1	2	1	2	3
1988	0	1	1			0	0	1	1	0	2	2
TOTALS==>	89	134	223	13	0	13	137	93	230	239	227	466

TABLE 2. DRILLING ACTIVITY IN OIL AND GAS FIELDS IN KREMMLING RESOURCE AREA

FIELD	BLM			FS			FEE/ST					
	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL
Alkali Lake	0	2	2	0	0	0	0	0	0	0	2	2
Battleship	0	0	0	0	0	0	4	9	13	4	9	13
Butler Ck	0	0	0	0	0	0	0	1	1	0	1	1
Canadian River	0	1	1	0	0	0	34	42	76	34	43	77
Carlstrom	0	0	0	0	0	0	0	1	1	0	1	1
Coalmont	1	0	1	0	0	0	0	2	2	1	2	3
Delany Butte	0	0	0	0	0	0	2	1	3	2	1	3
Grizzly Ck	0	0	0	0	0	0	0	1	1	0	1	1
Johnny Moore Mtn	0	1	1	0	0	0	0	0	0	0	1	1
Lone Pine	0	0	0	0	0	0	3	16	19	3	16	19
McCallum	24	94	118	0	0	0	1	3	4	25	97	122
McCallum, S	12	31	43	0	0	0	0	1	1	12	32	44
Michigan River	0	1	1	0	0	0	2	2	4	2	3	5
TOTALS==>	37	130	167	0	0	0	46	79	125	83	209	292
Wildcat	52	4	56	13	0	13	91	14	105	156	18	174
TOTALS==>	89	134	223	13	0	13	137	93	230	239	227	466

TABLE 3. TOTAL CUMULATIVE OIL AND GAS PRODUCTION IN THE KREMMLING RESOURCE AREA

FIELD	TOTAL WELLS				CUMULATIVE	
	SWI	PWR	OIL	GAS	OIL	GAS
Alkali Lake	0	1	233	0	4,211	0
Battleship	2	3	19,220	0	2,877,152	1,390
Butler Ck	1	0	0	0	20,900	14,871
Canadian River	7	23	3,225	146,434	487,123	7,923,890
Carlstrom	0	0	0	0	7,741	4,194
Coalmont	1	1	3,467	0	126,909	76,235
Delany Butte	1	1	790	0	7,827	1,373
Grizzly Ck	0	0	0	0	1,342	0
Johnny Moore Mtn.	1	0	309	550	36,189	64,693
Lone Pine	4	14	81,531	15,282	2,159,617	611,996
McCallum	4	35	122,602	129,832	8,328,617	716,322
McCallum, S	0	0	0	0	771,010	119,958
Michigan River	1	1	1,974	0	133,668	155,786
TOTALS==>	22	79	233,351	292,098	14,962,306	9,690,708
McCallum (CO2)	18	9	0	1,128,761	0	512,050,758
McCallum, S (CO2)	0	0	0	0	0	154,795,998
TOTALS==>	18	9	0	1,128,761	0	666,846,756

TABLE 4. CUMULATIVE PRODUCTION FROM FEDERAL LANDS IN THE KREMHLING RESOURCE AREA

FIELD	FEDERAL WELLS				CUMULATIVE		% FEDERAL	
	SWI	PWR	OIL	GAS	OIL	GAS	OIL	GAS
Alkali Lake	0	1	233	0	4,211	0	100.00%	
Battleship	0	0	0	0	0	0	0.00%	0.00%
Butler Ck	0	0	0	0	0	0	0.00%	0.00%
Canadian River	0	0	0	0	27,609	91,583	5.67%	1.16%
Carlstrom	0	0	0	0	0	0	0.00%	0.00%
Coalmont	0	0	0	0	13,448	16,560	10.60%	21.72%
Delany Butte	0	0	0	0	0	0	0.00%	0.00%
Grizzly Ck	0	0	0	0	0	0	0.00%	
Johnny Moore Mtn.	1	0	309	550	36,189	64,693	100.00%	100.00%
Lone Pine	0	0	0	0	0	0	0.00%	0.00%
McCallum	3	35	119,804	46,222	8,292,753	362,621	99.57%	50.62%
McCallum, S	0	0	0	0	739,308	119,958	95.89%	100.00%
Michigan River	0	0	0	0	9,164	7,286	6.86%	4.68%
TOTALS==>	4	36	120,346	46,772	9,122,682	662,701	60.97%	6.84%
McCallum (CO2)	18	9	0	1,128,761	0	512,050,758		100.00%
McCallum, S (CO2)	0	0	0	0	0	147,670,793		95.40%
TOTALS==>	18	9	0	1,128,761	0	659,721,551		98.93%

APPENDIX B

OIL AND GAS POTENTIAL AND REASONABLE FORESEEABLE LITTLE SNAKE RESOURCE AREA

INTRODUCTION

The Little Snake Resource Area (LSRA) sets on the southern edge of the Southwest Wyoming Basins Province. The LSRA portion of the Province contains the Sand Wash Basin, the Axial Basin Uplift, and portions of the Uinta, and the Park Range Uplifts (Figure 1) (Law 1988). Tectonic elements of the region are illustrated in Figure 2. The production of oil is primarily from fields located in and adjacent to the Laramie Basin, which in LSRA is the Axial Basin Uplift. The remainder of the hydrocarbon production in the resource area is nonassociated gas. Producing reservoirs range from Cambrian through Tertiary rocks and are composed dominantly of sandstone with minor carbonate reservoirs.

PROSPECTIVELY VALUABLE FOR OIL AND GAS

Land described as prospectively valuable (PV) for oil and gas is based on criteria described in Appendix 1. PV lands for the LSRA are shown in Figure 3 and generally include lands that have 1,000 feet of sedimentary rock, favorable structural setting, and minimum evidence of potential for the occurrence of oil and gas. Areas not designated as PV are rated as having no potential. The PV lands in LSRA are rated 2, Intermediate Low; 3, Intermediate High; or 4, High potential for oil and gas occurrence and prospective development. Areas not rated as PV (Area 1) are rated as having no potential for occurrence or development, though there may be potential for exploratory drilling.

OIL AND GAS POTENTIAL

Oil and gas potential rating criteria are described in Appendix 2 and is the basis for the ratings described below. Areas defined by the U.S. Geological Survey (USGS) as a play have a high potential for oil and gas occurrence.

Sand Wash Basin

The Sand Wash Basin is the southern most basin of the Basin Center Play. This play

includes the areas not considered in the other plays. It includes reservoirs that are stratigraphically equivalent to other assessed Cretaceous and Tertiary tight gas reservoirs as well as reservoirs stratigraphically above and below the tight gas reservoirs.

The tight gas play includes the Cretaceous and lower Tertiary reservoirs. The play is subdivided into five stratigraphic intervals: 1) the lower Cretaceous Dakota Sandstone and Upper Cretaceous Frontier Formation, 2) the Upper Cretaceous Mesaverde Group, 3) the Upper Cretaceous Lewis Shale, 4) the Upper Cretaceous Lance Formation, and 5) the lower Tertiary Fort Union Formation. Because of the difficulty in accurately locating the areas of conventional reservoirs within the tight reservoir area, some conventional reservoirs were probably included in the tight gas reservoir play.

Coal bed methane is assessed as part of the tight gas play.

Axial Basin Uplift

The Axial play area is located between the Piceance and Sand Wash Basins Figure 4. It appears to be a southeast extension of the eastern end of the Uinta Mountains Uplift. During much of Paleozoic time, the Axial arch was a structurally depressed area referred to as the Colorado trough. The principal reservoirs in the play include the Pennsylvanian Mintum Formation and Weber Sandstone; Triassic Shinarump Sandstone, and Moenkopi Formation; Jurassic Entrada Sandstone and Morrison Formation; Lower Cretaceous Dakota Sandstone; and Upper Cretaceous Frontier Formation, Niobrara Formation, and Morapop Sandstone Member of the Mancos Shale. Porosity ranges from 12 to 20 percent and permeability ranges from 0.1 to 300 millidarcys. Reservoir thickness ranges from 8 to 65 feet. The depth of reservoirs ranges from 2,000 to 12,000 feet.

The area is maturely explored. However, because the area is structurally complex and has experienced a long history of structural deformation, structural traps were likely formed as early as Pennsylvanian time. Thus, the temporal relationship between hydrocarbon generation and migration, and structural trap development were favorable.

POTENTIAL OF DEVELOPMENT

Uinta Uplift

The subthrust play is highly speculative. The play area is located along the overridden thrust margins of basins. Possible reservoirs include any of the reservoirs previously discussed in the province. The depth of occurrence is unknown but is related to depths of sedimentary rocks beneath the hanging wall of the thrust margin.

The Southwestern Wyoming province probably contains more wells drilled for this objective than anywhere else in the U. S., and most certainly, in the Rocky Mountain region. However, the play is immature to moderately maturely explored. There are large areas that appear to be unevaluated. There are no fields in the play area but the attributes of the play and the relatively unexplored nature of the play are intriguing.

Park Range Uplift

The Park Range is the western most expression of the Transcontinental Arch. It is composed primarily of Precambrian granitic rock.

This area is considered to have no potential for oil and gas occurrence (since there are no source rocks) and therefore none for development, even though it is recognized that exploration could take place.

OIL AND GAS ACTIVITY

Historical Background

Relatively small discoveries in the 1920s opened oil fields in Moffat and Routt counties. Tow Creek and Moffat oil fields were found in 1924. The major gas fields of Hiawatha and Powder Wash, in Sand Wash Basin, were discovered in 1925 and 1931 respectively (Rountree 1984).

Since 1924, fields have been discovered at the average rate of one field annually with peak discoveries in the late 1950s. Oil and gas development peaked in the late 1950s or early 1960s. Since that time, activity has remained at a relatively stable development level. Even in the late 1970s and early 1980s, while drilling records were being broken elsewhere in the Rocky Mountains, drilling activity did not surpass the record set in 1959 for LSRA.

PRESENT ACTIVITY

Exploration and development activity has generally declined from the high in 1980-1981 for conventional reservoirs. However, tax incentives for the development of coal-bed methane has resulted in maintaining a fairly high level of overall activity.

REASONABLY FORESEEABLE DEVELOPMENT ACTIVITY

Historical trends, present activity, and professional judgement were used to formulate the reasonably foreseeable development (RFD) scenario for oil and gas activity in the LSRA.

Based on analysis of historical trends, it is projected that 1,000 wells will be drilled within the planning unit in the next 20 years. Of that 1,000 wells, 550 could be on BLM-administered land within the planning unit. This projection is drawn from a gradually diminishing curve derived from the graph of past drilling activity.

The analysis of past drilling activity shows that 47 percent of the wells drilled in the LSRA were within unknown fields. (Note: The discovery well in each of the presently known fields is counted with the field total even though at the time of drilling the field itself would have been known). The remaining 53 percent of the wells drilled in the Resource Area are abandoned, unproductive wildcat wells. Assuming this ratio remains stable over the life of the plan, and applying it to the 550 projected wells, it means 259 more field development wells and 291 more wildcat wells will be drilled.

The average well densities of all known fields and projected drilling rates were applied to the potential ratings. Existing wells were counted in each of the potential areas and compared to the total wells within the LSRA.

<u>Potential Rating</u>	<u>Wells</u>
4	96.8%
3	3.0%
2	0.2%
1	< 0.1%

The varying density of existing development between potential areas was applied to the overall assumption of 550 wells over the life of the plan to determine an assumed level of

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development for each of the zones by applying the current ratio of wildcat wells to development wells.

This report is taken largely from Law, B.E. 1988.

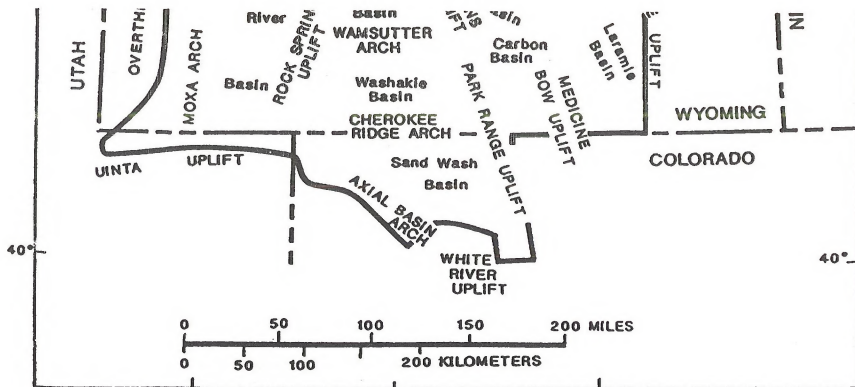


Figure 1.--Index map showing location of the Southwestern Wyoming Basins province and major structural features.

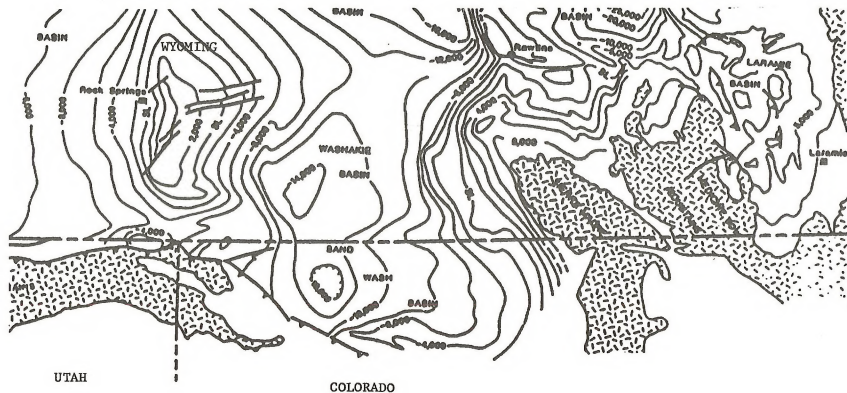
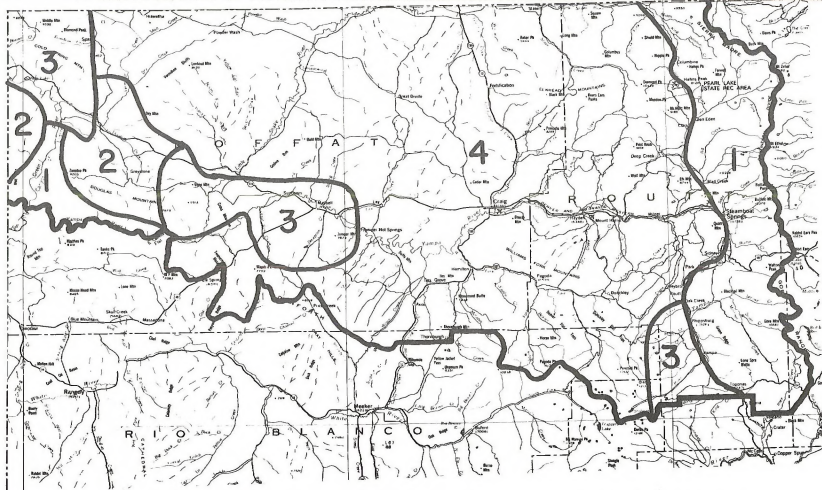


Figure 2.—Structure contour map of part of the Southwestern Wyoming Basins province. Structural datum is the top of the Lower Cretaceous Debote Sandstone. Contour interval 2,000 and 5,000 ft. Modified from Shooters and Hale (1972).

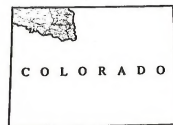
Figure 3 Oil and Gas Potential

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LITTLE SNAKE RESOURCE AREA

Resource Area Boundary



- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High

Scale 1:1,000,000
1 inch equals Approximately 16 miles



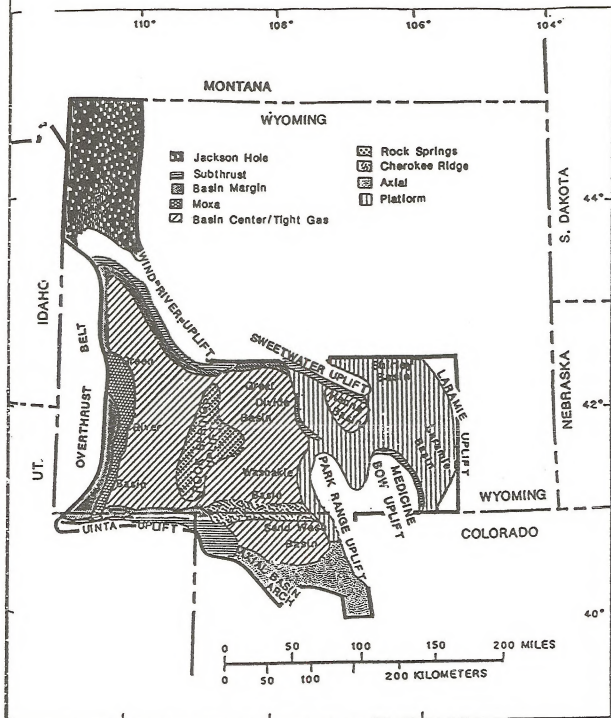


Figure A. --Map showing approximate locations of plays in the Southwestern Wyoming Basins province.

POTENTIAL OF DEVELOPMENT

POTENTIAL FOR OCCURRENCE AND DEVELOPMENT OF OIL AND GAS IN THE NORTHEAST PLANNING AREA

INTRODUCTION

The Northeast Planning Area (NPA) is situated within the Denver Basin and Las Animas Arch petroleum provinces (Figure 1). Hydrocarbons occur in lower Cretaceous sandstones of the Dakota Group (D and J sandstones), marine sandstones of the Pierre Shale, and the Permian Lyons Sandstone in the Denver Basin. The Las Animas Arch is productive from shelf carbonates and channel sands of the Pennsylvanian System (Topeka Limestone, Cherokee Limestone, Morrow Sandstone), and shelf carbonates from the Mississippian System (Spergen Osage Formations).

The Hotline database contains over 29,000 well records for the NPA and represents approximately 66 percent of the wells drilled in Colorado. The Denver Basin and Las Animas Arch provinces have been prolific oil and gas producers since oil was first discovered in Boulder County in 1901 from fractures in the Pierre Shale. Donaldson and MacMillan (1980) provide a detailed history of Colorado oil and gas development.

Federal mineral ownership, exclusive of the Pawnee National Grasslands, is minor and widely scattered. Less than 1 percent of the wells drilled were on BLM managed lands (surface ownership or split estate).

PROSPECTIVELY VALUABLE FOR OIL AND GAS

Land described as prospectively valuable (PV) for oil and gas is based on criteria described in Appendix 1. PV lands for the NPA include all lands east of the Front Range (approximately R. 70 W.).

OIL AND GAS POTENTIAL

Oil and gas potential rating criteria are described in Appendix 2 and is the basis for the ratings described below. Areas described by the U.S. Geological Survey (USGS) as a play have a high potential, and areas not PV have no potential unless otherwise noted.

Denver Basin

Oil and gas reservoirs in the Denver basin are both stratigraphically and structurally controlled, as well as combinations thereof. The Denver Basin play report has not been released by the USGS. For the purpose of this report, the Denver Basin, as shown on Figure 2, is predominantly high potential with moderate around the basin margin.

Las Animas Arch

The USGS has defined three plays in the Las Animas Arch area. Play areas (Figure 2) have a high potential for oil and gas, which are structurally trapped in carbonate and siliciclastic rocks of late Paleozoic age (Merewether 1987). The principal plays are a Mississippian structural play, Early Pennsylvanian stratigraphic play, and a Middle and Late Pennsylvanian stratigraphic play.

OIL AND GAS ACTIVITY

Historical Background:

Since the discovery of the Boulder Field in 1901, over 27,500 wells have been drilled within the Planning Area. This analysis includes oil and gas activity from 1953 through 1988. During the period, 25,294 wells were drilled with 52.5 percent completed as dry holes (Figure 3). Development wells had a success rate of 72.8 percent, while wildcat wells were only 13.4 percent.

Table 1 is a matrix of drilling activity broken down by major mineral ownership (BLM, U.S. Forest Service (USFS), and Fee/State) and by well type (development and wildcat). Only 171 wells or .68 percent of the total wells drilled were on BLM administered lands (exclusive of the Pawnee Grasslands). Total federal wells, including those on the grasslands is 336 (1.4 percent). Figure 3 illustrates the drilling history for federal lands during 1953 through 1988.

County drilling activity on federal lands is shown in Table 2 and Figure 4. The majority of activity has been on USFS lands in Weld County. Activity on BLM lands has been concentrated in Yuma County and near the Eckley and Beecher Island fields, western

APPENDIX B

Logan County, and scattered throughout Morgan County.

PRESENT ACTIVITY

Oil and gas activity in northeast Colorado has been on a down turn since 1984. This is due to market conditions resulting from the collapse of oil prices.

REASONABLY FORESEEABLE DEVELOPMENT ACTIVITY

Historical trends, USGS estimates, mineral ownership patterns, and professional judgment were the key ingredients in formulating the reasonable foreseeable development scenario.

Field size varies greatly within the Denver Basin. Fields that include federal lands have an average of one to two wells drilled on BLM lands. For instance, the Wattenberg Field has 2,930 wells, of which only four are on BLM lands. However, the Battle Canyon and Eckley Fields contain a much larger percentage of federal lands and have 15 of 43 and 35 of 99 wells completed on federal (BLM administered) lands, respectively. Therefore, it seems reasonable to expect future activity on federal lands to be within the areas having the highest percentage of federal minerals.

Oil and gas activity has been concentrated in the eastern portion of the Pawnee National Grasslands and resulted in the discovery and development of the Sooner, Lilli, and West Lilli Fields. It is conceivable that similar activity could occur on BLM managed-lands covered by this analysis. Therefore, the drilling forecast will include the federal wells drilled in the grasslands.

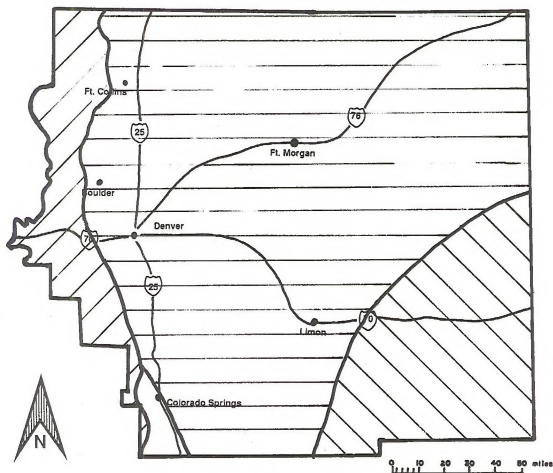
Forecasting Activity Based on Historical Trends

Since 1953, a total of 336 wells have been completed within the Planning Area. Future oil and gas activity is difficult to predict; however, a sudden increase in the demand for oil and gas or price increases could trigger a larger exploration and development program in the Planning Area. Evaluation of past activity and professional judgment indicates it is reasonable to expect at least one cycle of increased activity during the next 20 years.

Trend analysis and statistical forecasting based on historical activity indicate that 454 wells are forecast to be drilled within the high potential areas (Figure 2). An additional 22 wells are projected for the moderate and low potential areas. This forecast is based on the following assumptions and is the worst case scenario:

- Best fit, forecast to historical trend
- 51 percent of the wells are development and 9 percent are wildcat
- 66 percent success rate for development and 13 percent for wildcat wells

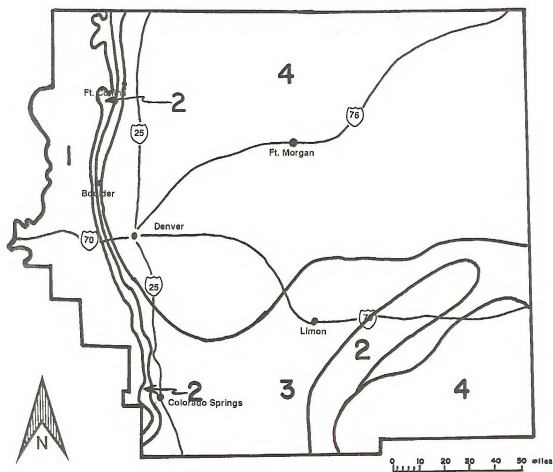
Of the 454 wells forecast, 232 development and 222 wildcat wells will be drilled on federal lands. One hundred fifty-three development and 30 wildcat wells are expected to be completed for production in the high potential areas. Four wells are forecast for the Las Animas Arch play area. An additional 20 wells, with three successful completions, are projected for the moderate potential area, and two dry holes in the low potential area.




NORTHEAST PLANNING AREA

-  Planning Area Boundary
-  Front Range
-  Denver Basin
-  Las Animas Arch

Figure 1 Major Structural Elements



NORTHEAST PLANNING AREA

 Planning Area Boundary

- 1 - None
- 2 - Low
- 3 - Moderate
- 4 - High

Figure 2 Oil and Gas Potential

OIL AND GAS ACTIVITY NORTHEAST

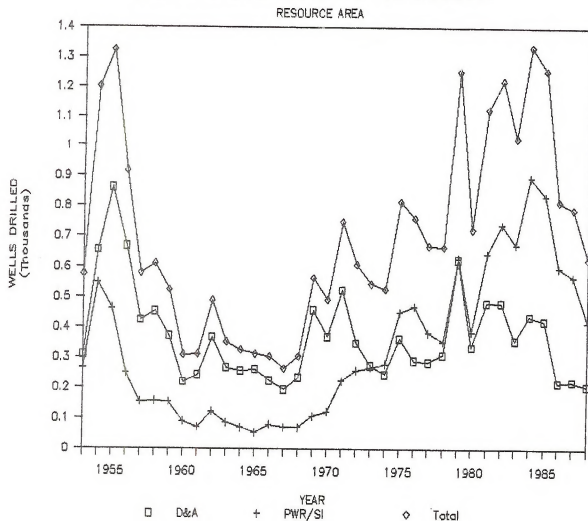


Figure 3. Oil and gas drilling activity graph for Northeast Resource Area (all lands).

OIL AND GAS ACTIVITY

NORTHEAST RESOURCE AREA

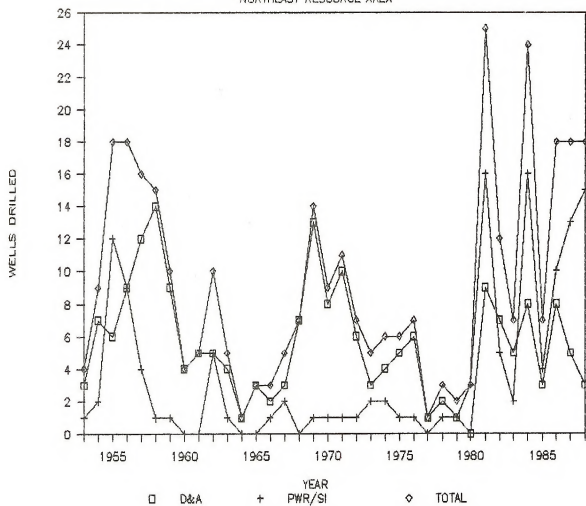


Figure 4. Oil and gas drilling activity graph for Northeast Resource Area (Federal lands: BLM and FS).

TABLE 1. NORTHEAST RESOURCE AREA OIL AND GAS DRILLING HISTORY
(1953 - 1980)

YEAR	DEVELOPMENT			TOTAL			FEDERAL			FEDERAL WILLCAT			FEDERAL DEVELOPMENT			TOTAL WILLCAT			TOTAL DEVELOPMENT			TOTAL WILLCAT			TOTAL GRAND TOTAL		
	QA	PM	TOTAL	QA	PM	TOTAL	QA	PM	TOTAL	QA	PM	TOTAL	QA	PM	TOTAL	QA	PM	TOTAL	QA	PM	TOTAL	QA	PM	TOTAL	QA	PM	TOTAL
	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
1953	1	0	1	1	1	2	1	2	3	1	3	4	1	3	4	1	3	4	1	3	4	1	3	4	1	3	4
1954	2	1	3	2	1	3	4	2	6	2	1	3	5	0	5	6	12	10	114	450	572	538	87	621	116	459	575
1955	0	3	3	4	0	4	3	7	1	12	13	5	0	5	6	12	10	199	379	570	538	87	621	116	459	575	
1956	4	7	11	1	0	1	5	7	12	6	14	3	1	4	9	9	10	146	197	343	315	33	358	91	119	310	
1957	2	1	3	2	0	2	4	1	5	3	2	5	9	2	11	12	4	16	88	117	205	325	33	358	91	119	310
1958	1	1	2	4	0	4	5	1	6	3	1	4	11	0	11	14	1	15	121	117	238	318	40	258	124	117	241
1959	1	1	2	2	0	2	3	1	4	1	2	8	0	8	9	1	10	103	119	222	259	34	293	104	119	223	
1960	0	0	0	4	0	4	0	4	0	4	0	4	0	4	0	4	4	64	74	140	158	16	146	66	74	140	
1961	0	0	0	3	0	3	0	3	0	3	0	3	0	3	0	3	5	72	40	132	166	10	127	72	40	132	
1962	0	1	1	3	1	4	3	2	5	1	3	4	2	6	5	10	90	105	195	273	13	286	91	107	198		
1963	1	0	1	3	0	3	4	0	4	3	0	3	1	1	2	4	1	5	88	77	165	175	7	182	91	78	169
1964	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	79	40	139	177	9	188	80	40	140		
1965	1	0	1	1	0	1	2	0	2	1	0	1	2	0	2	3	0	3	76	50	126	182	3	185	77	50	127
1966	1	1	2	1	0	1	2	0	2	1	1	2	1	0	1	2	1	46	71	137	157	8	165	67	61	138	
1967	1	1	2	1	0	1	2	1	3	1	2	3	2	5	7	0	2	72	41	133	157	8	165	74	61	135	
1968	1	0	1	3	0	3	4	0	4	2	0	2	5	0	5	7	0	72	41	133	157	8	165	74	61	135	
1969	0	0	0	6	0	6	0	6	0	6	0	6	0	6	0	2	11	14	81	91	172	363	14	377	83	92	175
1970	0	0	0	1	0	1	1	0	1	0	0	0	1	0	0	8	1	9	72	96	168	209	24	314	72	97	169
1971	2	0	2	5	0	5	7	0	7	3	1	4	7	0	7	10	11	107	173	280	407	52	459	110	173	283	
1972	0	0	0	3	0	3	3	0	3	1	0	1	5	1	6	1	7	106	220	326	237	37	274	107	221	328	
1973	0	1	0	1	0	1	0	2	1	1	2	1	2	1	3	3	2	5	60	242	302	212	25	237	61	243	304
1974	2	4	2	2	0	2	4	2	6	2	2	4	2	0	2	4	2	6	59	250	309	184	31	215	61	250	311
1975	1	0	1	2	1	3	1	3	1	4	1	0	1	4	1	5	1	6	106	417	523	254	32	286	107	418	525
1976	2	1	3	2	0	2	4	1	5	2	1	3	4	0	4	6	1	7	87	465	532	198	25	223	89	465	534
1977	1	0	1	0	0	1	0	1	0	1	0	0	1	0	0	1	1	74	333	407	211	50	243	75	333	409	
1978	0	1	1	0	1	1	1	0	1	1	0	1	2	0	2	1	3	99	284	383	210	71	283	31	284	383	
1979	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	2	199	515	714	424	114	538	199	515	714	
1980	0	2	2	1	2	3	1	4	5	0	3	0	0	0	0	3	25	182	329	451	214	59	273	122	329	451	
1981	1	12	13	4	2	6	5	14	19	3	14	17	6	2	8	9	16	25	182	561	743	292	79	371	185	563	
1982	3	2	5	0	0	3	2	5	5	10	2	0	2	7	5	12	213	669	882	261	72	335	218	669	887		
1983	0	0	0	2	0	2	0	2	2	4	4	3	0	3	0	7	7	152	608	740	201	66	276	154	608	742	
1984	1	14	15	2	0	2	3	14	17	1	16	17	7	0	8	16	24	187	843	1030	243	53	296	188	843		
1985	1	0	1	1	1	2	2	3	2	4	1	2	3	4	1	2	3	4	168	748	936	251	43	314	170	770	
1986	1	6	7	1	0	1	2	6	8	2	9	11	6	1	7	8	10	18	96	575	671	115	21	136	98	576	
1987	0	1	1	0	0	1	0	1	1	1	1	1	1	1	1	5	13	100	497	605	110	70	100	109	498		
1988	0	2	2	0	1	0	0	3	2	13	15	1	2	3	3	15	18	100	401	501	105	14	117	102	403		

Totals==> 31 61 92 68 11 79 99 72 171 58 114 172 143 21 164 201 135 336 3888 19545 14433 9193 1475 10418 3946 19546 14512 9336 1466 19782 13782 12012 25294

TABLE 2. COUNTY DRILLING ACTIVITY TOTALS ON FEDERAL LANDS **
(1953-1988)

COUNTY	DEVELOPMENT		WILDCAT			TOTALS			TOTAL	%
	D&A	PWR	TOTAL	D&A	PWR	TOTAL	D&A	PWR		
Adams	4	0	4	2	1	3	6	1	7	2.08%
Kit Carson	0	0	0	0	1	1	0	1	1	0.30%
Logan	7	0	7	15	2	17	22	2	24	7.12%
Morgan	6	15	21	29	3	32	35	18	53	15.73%
Sedgwick	0	2	2	1	0	1	1	2	3	0.89%
Washington	6	1	7	16	0	16	22	1	23	6.82%
Weld: FS	31	61	92	68	11	79	99	72	171	50.74%
Weld: BLM	0	3	3	12	2	14	12	5	17	5.04%
Yuma	4	32	36	1	1	2	5	33	38	11.28%
TOTALS==>	58	114	172	144	21	165	202	135	337	100.00%

** - Forest Service lands only in Weld County

POTENTIAL OF DEVELOPMENT

POTENTIAL FOR OCCURRENCE AND DEVELOPMENT OF OIL AND GAS IN THE SAN JUAN/SAN MIGUEL PLANNING AREA

INTRODUCTION

The San Juan/San Miguel Planning Area (SJ/SMPA) is situated within the San Juan Basin and Paradox Basin petroleum provinces (Figure 1). Tectonic elements of the region are illustrated in Figure 2. Both basins are classified as craton-accreted margin basins, characterized by two or more cycles of deposition. The cycles typically consist of a carbonate shelf or platform sediments followed by a second cycle of orogenic clastics. The cycles occurred during the Paleozoic and upper Cretaceous to Oligocene, respectively.

PROSPECTIVELY VALUABLE FOR OIL AND GAS

Land described as prospectively valuable (PV) for oil and gas is based on criteria described in Appendix 1. PV lands for the SJ/SMPA are shown in Figure 3. Areas not designated as PV are rated as having no potential.

OIL AND GAS POTENTIAL

Oil and gas potential rating criteria are described in Appendix 2 and are the basis for the ratings described below. Areas defined by the USGS as a play have a high potential for oil and gas.

San Juan Basin

Oil and gas reservoirs in the San Juan Basin are partially stratigraphically controlled. Huffman (1988) describes production from the central part of the basin as controlled by hydrodynamic forces and stratigraphy. Basin margin production is predominantly controlled by stratigraphy and structure. Pennsylvanian oil production is found along the northwestern margin of the basin and is restricted to porous biohermal carbonate buildups.

The USGS has defined seven plays in the San Juan Basin. Only six of the plays are found in the SJ/SMPA. They are the Pennsylvania, Dakota, Gallup, Mesaverde,

Pictured Cliffs, and Fruitland/Kirtland plays (Figures 4-9). A detailed description of each play can be found in Huffman (1988).

Paradox Basin

Oil and gas reservoirs in the Paradox Basin are both structural and stratigraphic, as well as combination traps. The principal reservoirs are developed in the Pennsylvanian Hermosa Group. Porous carbonate bioherm buildups trap oil and gas (i.e., including CO₂ at McElmo Dome Field) in the Paradox Formation. The younger Honaker Trail Formation contains gas reservoirs in fluvial basin margin sandstones and conglomerates.

The USGS report on the Paradox Basin plays has not been released. However, the Pennsylvanian play boundary is shown in the San Juan Basin report (Huffman 1988; Figure 4).

The majority of the Planning Area (Figure 4) is within the Pennsylvanian play, as defined by the USGS.

OIL AND GAS ACTIVITY

Historical Background

Several dry holes were drilled prior to the discovery of the Red Mesa Field in the San Juan Basin in 1924 and the 1944 discovery of the McElmo Field in the Paradox Basin. Oil and gas exploration has accelerated through the 1930s, late 1940s to mid-1950s, through the 1960s, and peaked since the mid-1970s (Figure 10; Table 1). Present activity is due primarily to development of coal bed methane in the northern San Juan Basin.

Production has been from 16 fields in the Paradox Basin and nine fields in the San Juan Basin. Tables 2 and 3 illustrate development and wildcat wells drilled on BLM, U.S. Forest Service (USFS), and Fee/State lands for the Paradox and San Juan Basins, respectively. Approximately 68 percent of the Paradox Basin wells are drilled on BLM lands, while only 7 percent in the San Juan Basin.

Cumulative production from all fields in the Paradox Basin, through 1987, has been 10,529,390 BO and 72,556,573 MCFG, U.S. as well as 555,198,284 MCFG of CO₂ produced from the McElmo Field (Table 4).

APPENDIX B

San Juan Basin production during the same period was 8,349,066 BO and 850,944,153 MCFG (Table 5). Oil and gas production from federal wells has been 9,645,030 BO and 68,472,003 MCFG, as well as 555,198,284 MCF of CO₂ from the Paradox (Table 6), while production from the San Juan amounted to 8,987 BO and 52 MCFG (Table 1).

Federal wells account for approximately 91 percent of oil, 94 percent of gas, and 100 percent of CO₂ in the Paradox and less than 1 percent of oil in the San Juan Basin.

PRESENT ACTIVITY

Exploration and development activity has generally declined from the high activity of 1980-1981 (Table 1) for conventional reservoirs. However, tax incentives for the development of coal-bed methane has resulted in maintaining a fairly high level of activity.

REASONABLY FORESEEABLE DEVELOPMENT ACTIVITY

Historical trends, USGS estimates, present activity, and professional judgment were used to formulate the reasonably foreseeable development (RFD) scenario for oil and gas activity in the SJ/SMPA. The main problem encountered with this evaluation is that the USGS hydrocarbon play analysis (Huffman 1988; Unreleased Report on Paradox Basin) and the Planning Area boundaries do not coincide. For this reason, the RFD scenario will be based on forecasting activity based on historical trends.

Forecasting Activity Based on Historical Trends

Since 1902, a total of 919 wells have been completed within the Planning Area (exclusive of Indian lands). Future oil and gas activity is difficult to predict; however, a sudden increase in the demand for oil and gas or price increases could trigger a larger exploration and development program. Evaluation of past activity and personal judgment indicates it is reasonable to expect at least one cycle of increased drilling activity during the next 20 years.

Trend analysis and statistical forecasting based on historical activity (Gardner 1988)

was developed on two main assumptions outlined below:

- A. Tax credits for coal-bed methane and continued past 1990.
 1. Low development scenario.
 - a. Best fit of forecast wells to actual historical wells drilled
 - b. San Juan Basin
 - (1) 55% total wells forecast
 - (2) 7% on BLM: 43% development with 31% success rate and 57% wildcard with 10% success rate
 - c. Paradox Basin
 - (1) 45% total wells forecast
 - (2) 68% on BLM: 60% development with 67% success rate and 40% development with 19% success rate
 2. High development scenario
 - a. Best fit, statistically with lowest mean squared error
 - b. As above in low development scenario
 - c. As above in low development scenario
- B. Tax credits for coal-bed methane not continued past 1990
 1. Low development scenario
 - a. As above in A
 - b. As above in A
 - c. As above in A
 2. High development scenario
 - a. As above in A
 - b. As above in A
 - c. As above in A

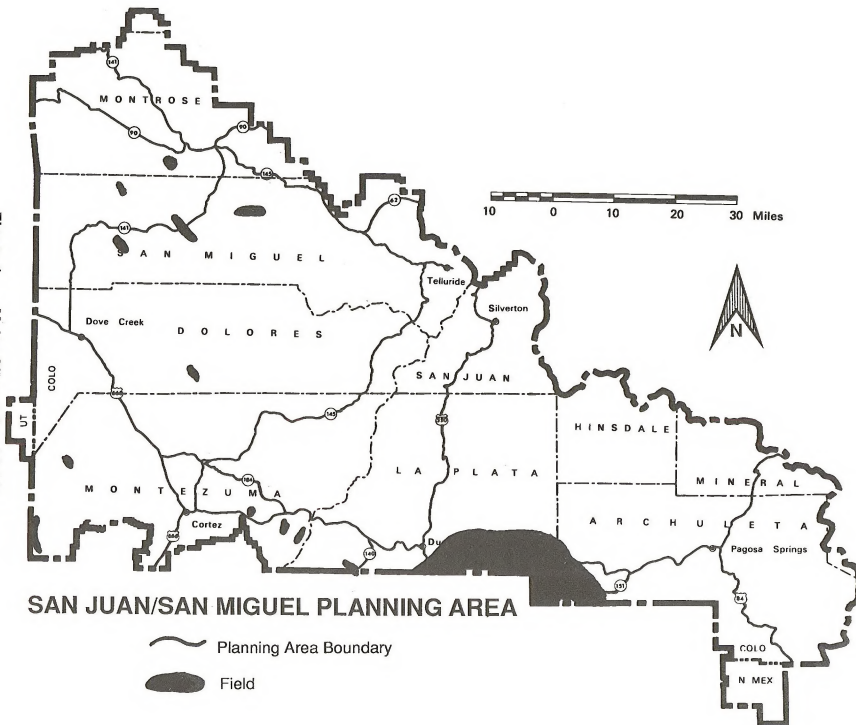
A total of 540 and 1,024 wells, respectively, are forecast under the low and high development scenarios of the forecast based on continuation of the tax credits; while 508 and 981 wells, respectively, are forecast under the forecast based on the tax credits being eliminated (Table 8).

The high development scenario is considered to be the worst case scenario that will be used to develop the oil and gas activity projection. Development drilling in the Paradox Basin is expected to be concentrated within and near existing fields, especially within the Blanding

POTENTIAL OF DEVELOPMENT

Basin and Four Corners Carbonate Platform (Figure 2). A total of 313 wells are projected to be drilled on BLM lands, of which 188 will be development wells and 125 will be wildcat wells. This projection will result in 126 development and 24 exploratory wells completed for production within the areas shown on Figure 11 (Table 9).

The San Juan Basin portion of the Planning Area is expected to have about 40 wells drilled on BLM lands (Figure 11). Sixteen of the wells are projected to be development and 24 exploratory. Five of the development and three of the exploratory wells will be completed for production.



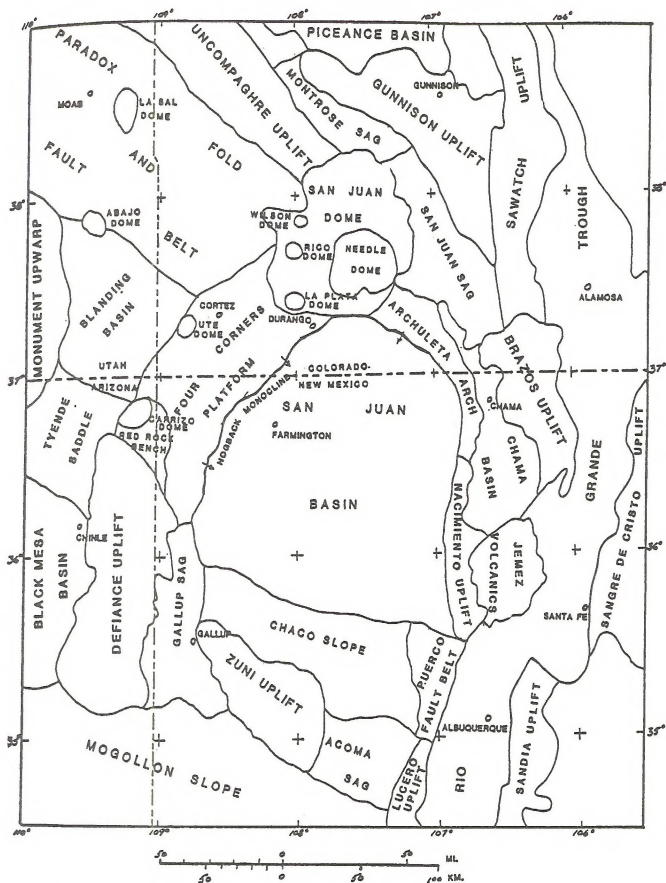


Figure 2.--Structural elements in the vicinity of the San Juan Basin petroleum province (modified after Kelley and Clinton, 1960; Grose, 1972; and Woodward, 1974).

Figure 3 Prospectively Valuable Lands

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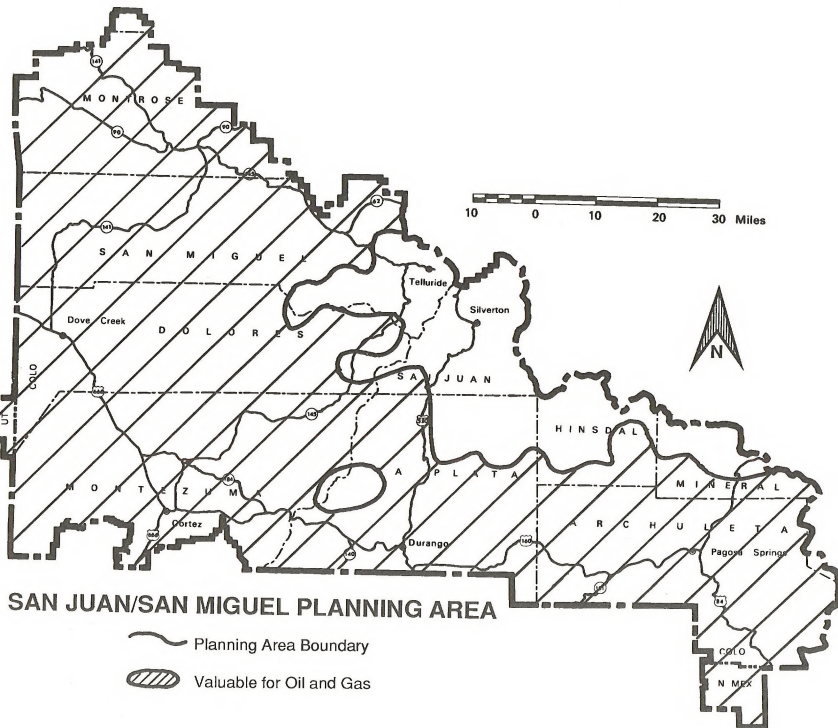


Figure 4 Pennsylvanian Play

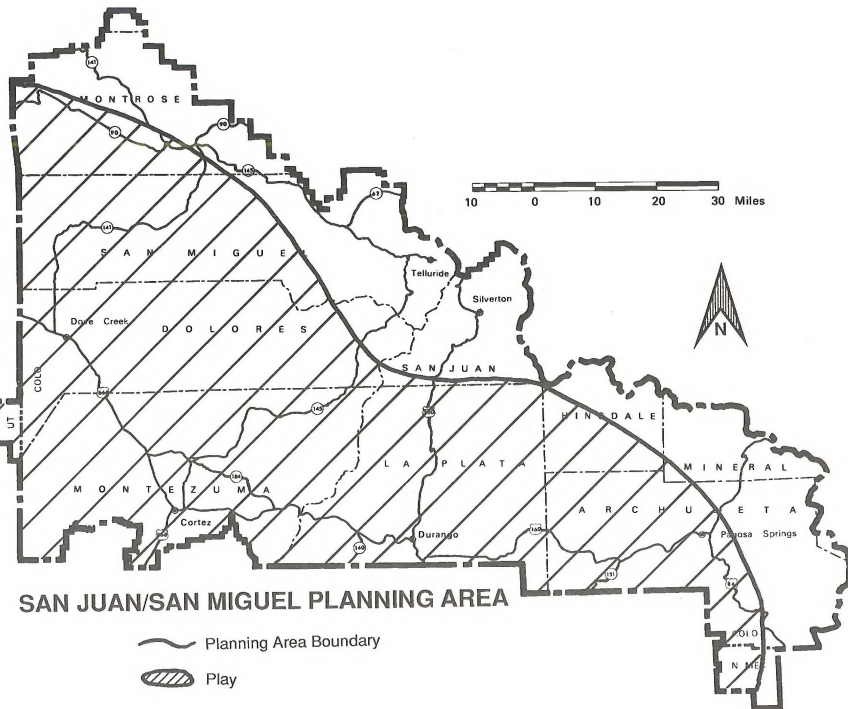


Figure 5
B-54
Dakota Play

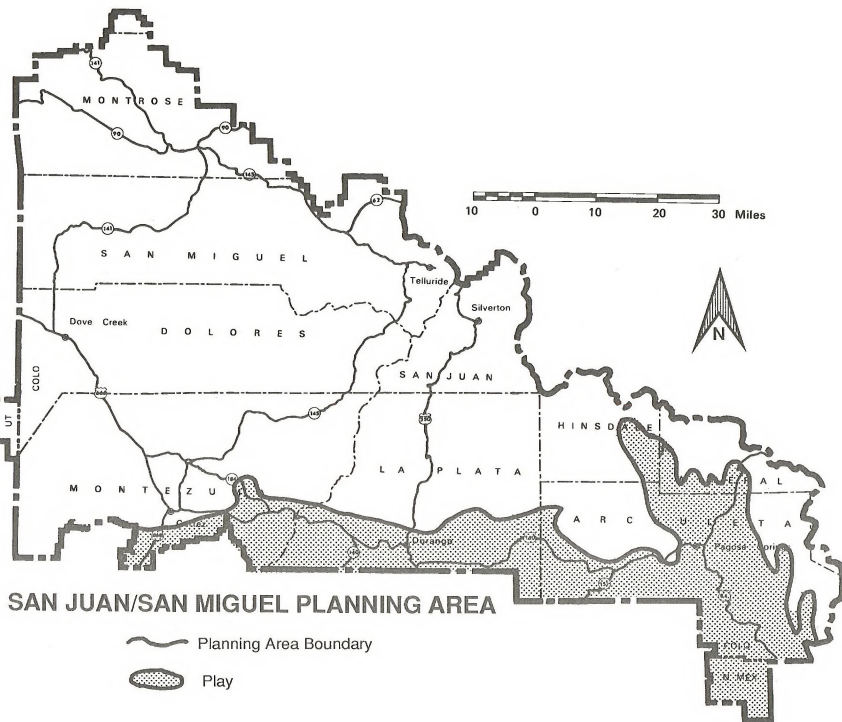
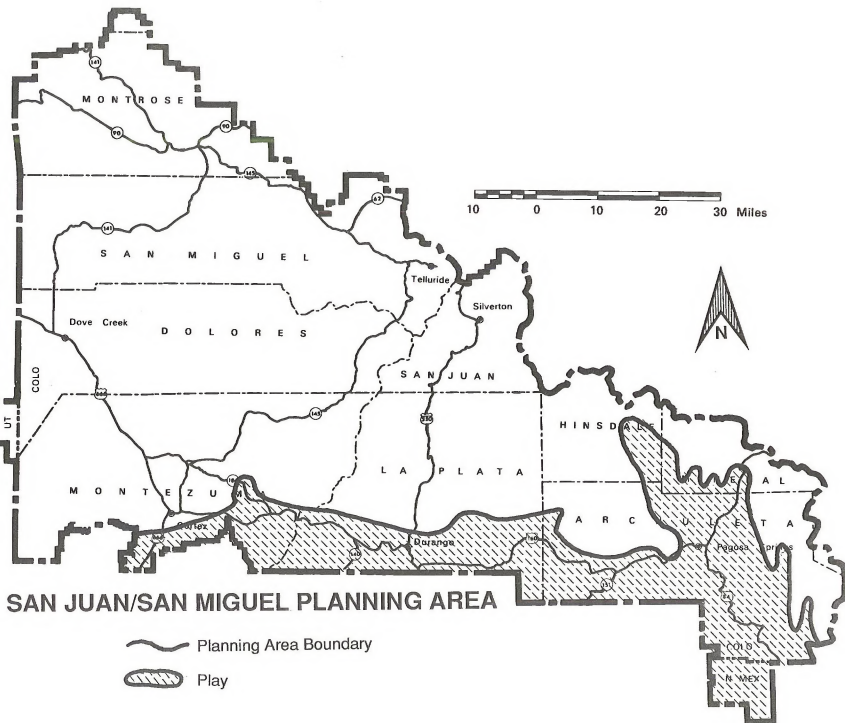
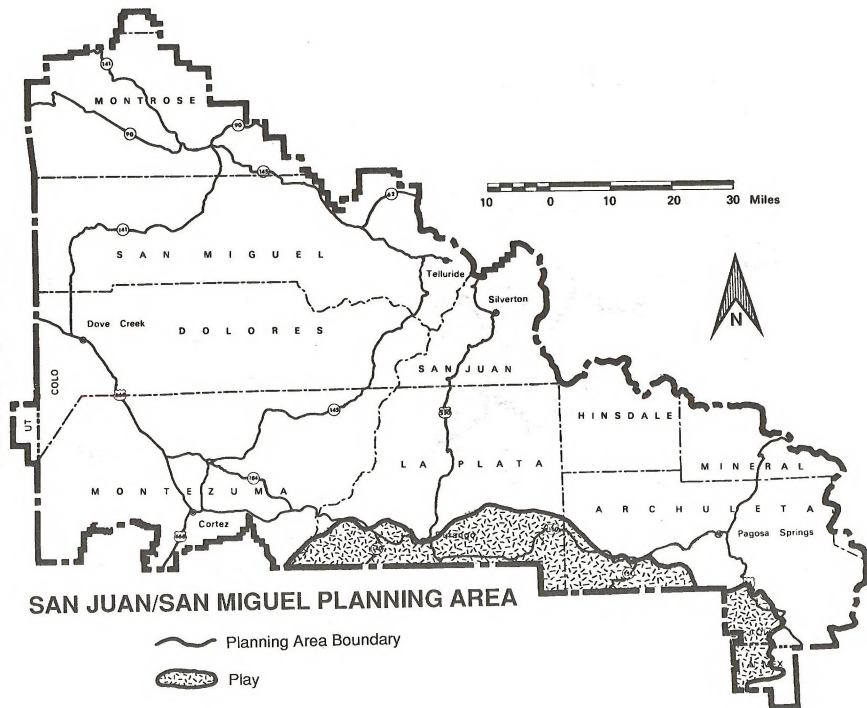


Figure 6
Gallup Play



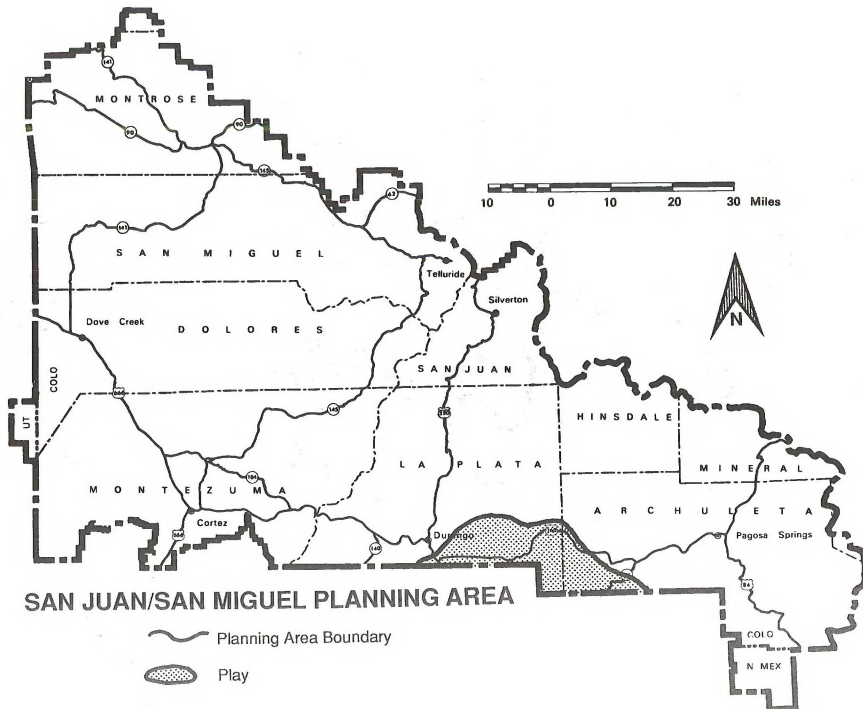
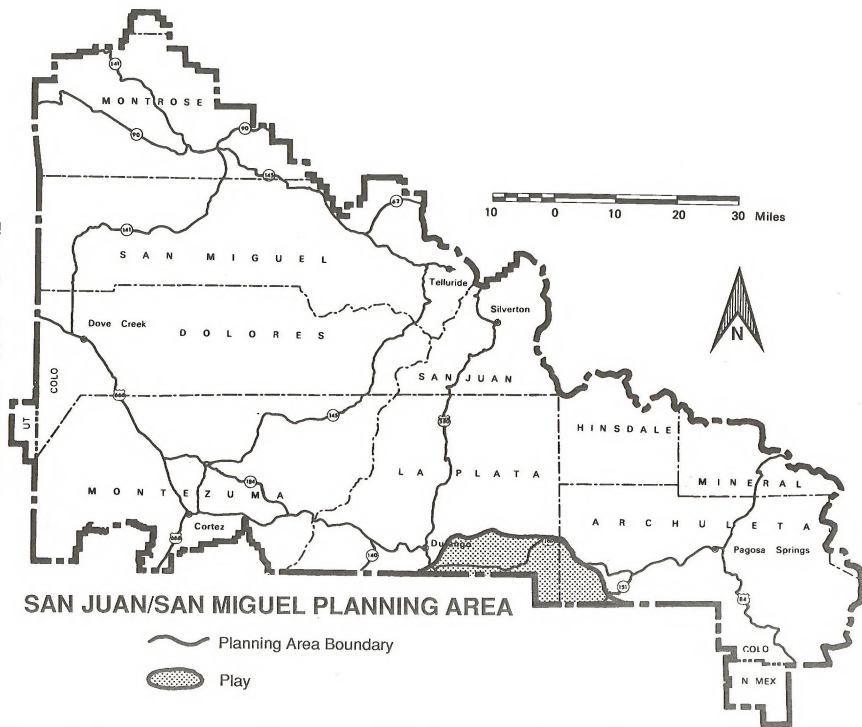


Figure 9
Fruitland/Kirtland Play

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SAN JUAN RESOURCE AREA

DRILLING ACTIVITY (BLM,FS,FEE/STATE)

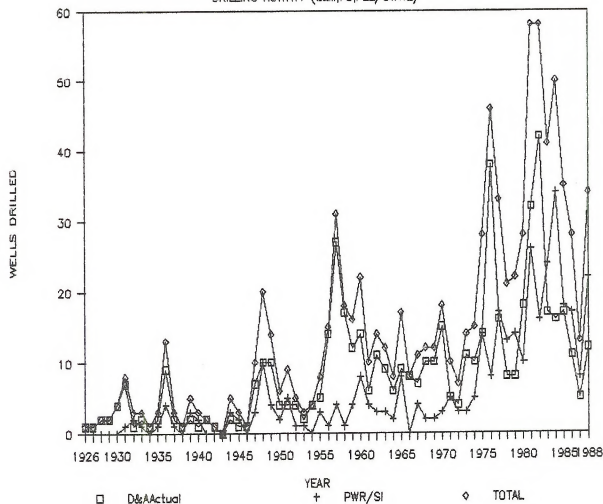


Figure 10. Oil and gas activity graph for the San Juan Resource Area (1926 - 1988).

Figure 11 Oil and Gas Potential

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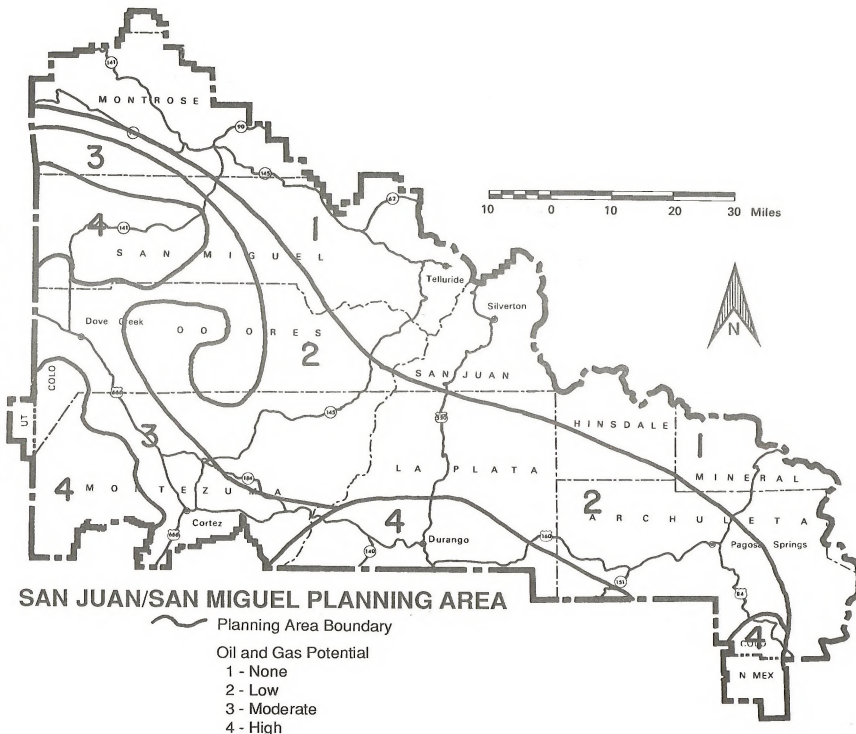


TABLE 1a. OIL AND GAS ACTIVITY FOR SAN JUAN RESOURCE AREA (1902 - 1988)

YEAR	BLM			FS			FEE/ST			JT		
	P&A	PWR/VS	TOTAL	P&A	PWR/VS	TOTAL	P&A	PWR/VS	TOTAL	P&A	PWR/VS	TOTAL
1902	1		1			0			0	1	0	1
1903			0			0	4		4	4	0	4
1904			0			0			0	0	0	0
1905			0			0			0	0	0	0
1906			0			0			0	0	0	0
1907			0			0			0	0	0	0
1908			0			0			0	0	0	0
1909			0			0			0	0	0	0
1910			0			0			0	0	0	0
1911	1		1			0			0	1	0	1
1912			0			0			0	0	0	0
1913			0			0			0	0	0	0
1914			0			0			0	0	0	0
1915			0			0			0	0	0	0
1916			0			0			0	0	0	0
1917			0			0			0	0	0	0
1918			0			0			0	0	0	0
1919			0			0			0	0	0	0
1920			0			0	2		2	2	0	2
1921			0			0			0	0	0	0
1922		1	1			0			0	0	1	1
1923			0			0			0	0	0	0
1924			0			0			0	0	0	0
1925			0			0	1		1	1	0	1
1926			0			0	1		1	1	0	1
1927			0			0	1		1	1	0	1
1928	1		1			0	1		1	2	0	2
1929			0			0	2		2	2	0	2
1930			0	1		1	3		3	4	0	4
1931			0			0	7	1	8	7	1	8
1932		1	1			0	1	1	2	1	2	3
1933		1	1			0	2		2	2	1	3
1934			0			0	1		1	1	0	1
1935			0			0	2	1	3	2	1	3
1936			0			0	9	4	13	9	4	13
1937			0			0	2	1	3	2	1	3
1938			0			0	1		1	1	0	1
1939			0			0	2	3	5	2	3	5
1940			0			0	1	2	3	1	2	3
1941			0			0	2		2	2	0	2
1942			0			0	1		1	1	0	1
1943			0			0			0	0	0	0
1944			0			0	2	3	5	2	3	5
1945			0			0	1	2	3	1	2	3
1946			0			0	1		1	1	0	1
1947	1		1			0	6	3	9	7	3	10
1948	1	3	4	2		2	7	7	14	10	10	20
1949	2		2	1		1	7	4	11	10	4	14
1950	1		1			0	3	2	5	4	2	6
1951	2		2			0	2	5	7	4	5	9
1952			0			0	4	1	5	4	1	5
1953			0			0	2	1	3	2	1	3
1954	1		1	1		1	2		2	4	0	4
1955	3		3			0	2	3	5	5	3	8
1956	2	1	3	1		1	11		11	14	1	15
1957	11		11			0	16	4	20	27	4	31
1958	9	1	10	1		1	7		7	17	1	18
1959	9	2	11		1	1	3	1	4	12	4	16
1960	9	6	15	2		2	5	2	7	14	8	22
1961	2	3	5	1	1	2	3		3	6	4	10
1962	3	3	6	2		2	6		6	11	3	14
1963	8	2	10			0	1	1	2	9	3	12
1964	2	2	4	1		1	3		3	6	2	8
1965	5	8	13			0	4		4	9	8	17
1966	5		5	1		1	2		2	6	0	6

TABLE 1b. OIL AND GAS ACTIVITY FOR SAN JUAN RESOURCE AREA (1902 - 1988)

1967	2	4	8	2		2	3		3	7	4	11
1968	6	2	8	2		2	2		2	10	2	12
1969	4	1	5	1		1	5	1	6	10	2	12
1970	8	3	11	8		6	1		1	15	3	18
1971	3	3	8	1		1	1	2	3	5	5	10
1972	2	3	5			0	2		2	4	3	7
1973	4	3	7	2		2	5		5	11	3	14
1974	3	2	5	1		1	8	3	9	10	5	15
1975	8	3	9			0	8	11	19	14	14	28
1976	5	3	8			0	33	5	38	38	8	46
1977	7	3	10	1	1	2	8	13	21	19	17	33
1978	2	8	8		2	2	8	5	11	8	13	21
1979	3	5	8			0	5	9	14	8	14	22
1980	4	2	6			0	14	8	22	18	10	28
1981	3	2	5	4	3	7	25	21	46	52	29	58
1982	5	8	11	8	2	8	31	8	39	42	16	58
1983	4	15	19		1	1	13	8	21	17	24	41
1984	7	25	32		1	1	9	8	17	16	24	50
1985	8	9	17	2	2	4	7	7	14	17	18	35
1986	7	1	8	1	8	9	3	8	11	11	17	26
1987	3	3	8		1	1	2	4	8	5	8	13
1988	4	1	5	2	3	5	8	18	24	12	22	34
TOTALS==	179	199	318	45	26	71	339	191	590	569	356	919

TABLE 2. FIELD SUMMARY SJRA PARADOX BASIN

FIELD	BLH			FS			FEE/ST			GT			BLH %
	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	
Andy's Mesa	2	5	7							2	5	7	100.00%
Cache	0	9	9							0	9	9	100.00%
Cahone	1	0	1							1	0	1	100.00%
Dove Ck	2	1	3				7	2	9	9	3	12	25.00%
Dry Ck	1	0	1							1	0	1	100.00%
Egnar	1	1	2				1	0	1	2	1	3	66.67%
Flodine Pk	12	8	20							12	8	20	100.00%
Flodine Pk, E.	0	1	1							0	1	1	100.00%
Goodman Pt	4	0	4							4	0	4	100.00%
Hamilton Ck	1	1	2							1	4	5	40.00%
Kernan Canyon	2	0	2				0	4	4	2	4	6	33.33%
Lisbon, SE	2	2	4							2	2	4	100.00%
McClellan	2	2	4				0	1	1	2	3	5	80.00%
McElmo	12	50	62	1	0	1	2	6	8	15	56	71	87.32%
Papoose Canyon	14	33	47				2	5	7	16	38	54	87.04%
Squam Ck							1	1	2	1	1	2	0.00%
Wildcat	91	21	112	17	7	24	59	15	74	167	43	210	53.33%
TOTALS==>	147	134	281	18	7	25	72	37	109	237	178	415	67.71%

TABLE 3. FIELD SUMMARY SJRA SAN JUAN BASIN

FIELD	BLM			FS			FEE/ST			GT			BLM %
	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	D&A	PWR/SI	TOTAL	
Chrono							19	23	42	19	23	42	0.00%
Iganco Blanco				2	15	17	3	36	39	5	51	56	0.00%
Mancos River	3	0	3				22	2	24	25	2	27	11.11%
Menefee Mtn	1	0	1				12	14	26	13	14	27	3.70%
Navajo							1	4	5	1	4	5	0.00%
Point Lookout	1	0	1				7	1	8	8	1	9	11.11%
Price Gramps	1	1	2				24	41	65	25	42	67	2.99%
Red Mesa							1	0	1	1	0	1	0.00%
Sierra	5	4	9				38	20	58	43	24	67	13.43%
Wildcat	21	0	21	25	4	29	140	13	153	186	17	203	10.34%
TOTALS==>	32	5	37	27	19	46	267	154	421	326	178	504	7.34%
GT=====	179	139	318	45	26	71	339	191	530	563	356	919	34.60%

TABLE 4. TOTAL FIELD PRODUCTION SJRA PARADOX BASIN

FIELD	1987			CUMULATIVE		
	SI	PWR	OIL	GAS	OIL	GAS
Andy's Mesa	0	7	0	429,356	21,184	17,405,075
Cacho	3	9	64,272	36,463	3,906,168	7,020,736
Cahone	0	1	6,398	14,972	17,791	40,430
Dove Ck	1	0	0	0	82,961	946,234
Flodine Pk	2	7	33,662	98,367	2,340,832	8,531,211
Flodine Pk, E.	0	1	50,951	0	50,951	0
Goodman Pt	0	0	0	0	1,401	552
Hamilton Ck	3	0	0	215,270	0	925,481
Kernan Canyon	0	0	0	0	150	0
Lisbon, SE	3	2	41	274,718	156,037	14,089,322
McClean	2	2	39,430	45,537	246,008	248,833
McElmo	0	2	0	12,051	1,097	891,617
Papoose Canyon	7	24	336,536	1,936,621	3,693,621	22,432,750
Squan Ck	0	0	0	0	11,189	24,332
TOTALS==>	21	55	531,290	3,063,355	10,529,390	72,556,573
McElmo(C02)	5	23	0	173,560,252	0	555,198,284

TABLE 5. TOTAL FIELD PRODUCTION SJRA SAN JUAN BASIN

FIELD	SI	PWR	1987		CUMULATIVE		
			OIL	GAS	OIL	GAS	
Chromo		7	3	646	0	162,964	6,342
Iganco Blanco*	96	938		5,204	27,004,071	42,145	849,611,960
Mancos River	0	2		427	0	25,242	0
Menefee Mtn	3	0		44	0	48,883	255
Navajo	0	3		4,132	0	4,686	0
Point Lookout	0	0		0	0	0	23,000
Price Gramps	4	26		50,862	0	6,524,698	0
Red Mesa*	15	88		93,467	104,016	1,419,441	1,273,575
Sierra	2	4		2,310	0	121,007	29,021
TOTALS==>	127	1064		157,092	27,108,087	8,349,066	850,944,153

* Includes Indian production

TABLE 6. TOTAL FIELD PRODUCTION SJRA PARADOX BASIN - FEDERAL

FIELD	SI	PWR	1987		CUMULATIVE	
			OIL	GAS	OIL	GAS
Andy's Mesa	0	7	0	429,356	21,184	17,405,075
Cache	3	9	64,272	36,463	3,906,168	7,020,736
Cahone	0	1	6,398	14,972	17,791	40,430
Dove Ck	1	0	0	0	82,961	946,234
Flodine Pk	2	7	33,662	98,367	2,340,832	8,531,211
Flodine Pk, E.	0	1	50,951	0	50,951	0
Goodman Pt	0	0	0	0	1,401	552
Hamilton Ck	2	0	0	146,953	0	391,442
Kernan Canyon	0	0	0	0	0	0
Lisbon, SE	3	2	41	274,718	156,037	14,089,322
McClean	0	1	19,465	23,141	130,673	109,078
McElmo	0	2	0	12,051	1,097	891,617
Papoose Canyon	3	20	114,687	1,152,059	2,935,935	19,046,306
Squam Ck	0	0	0	0	0	0
TOTALS==>	14	50	289,476	2,188,080	9,645,030	68,472,003
McElmo(CO2)	5	23	0	173,560,252	0	555,198,284

TABLE 7. TOTAL FIELD PRODUCTION SJRA SAN JUAN BASIN - FEDERAL

FIELD	SI	PWR	1987		CUMULATIVE		
			OIL	GAS	OIL	GAS	
Chromo	0	0	0	0	0	0	0
Iganco Blanco	0	0	0	0	0	0	0
Mancos River	0	0	0	0	0	0	0
Menefee Mtn	0	0	0	0	0	0	0
Navajo	0	0	0	0	0	0	0
Point Lookout	0	0	0	0	0	0	0
Price Gramps	0	0	0	0	0	0	0
Red Mesa	0	0	0	0	0	0	0
Sierra	0	0	0	0	8,987		52
TOTALS=>	0	0	0	0	8,987		52

TABLE 8. FORECAST MATRIX FOR BLM DRILLING ACTIVITY
FOR 1989 THROUGH 2010.

	PARADOX BASIN							SAN JUAN BASIN						
	WC			DEV			SUB TOTAL	WC			DEV			GRAND TOTAL
	D&A	PWR	TOTAL	D&A	PWR	TOTAL		D&A	PWR	TOTAL	D&A	PWR	TOTAL	
Tax Credits														
Low Dev.	79	18	97	48	98	146	243	10	2	12	5	3		
High Dev.	101	24	125	62	126	188	313	21	2	23	12	5		
No Tax Credit														
Low Dev.	50	12	62	31	62	93	155	10	2	12	5	3		
High Dev.	97	23	120	60	120	180	300	20	2	22	11	5		

TABLE 9. FORECAST MATRIX FOR BLM DRILLING ACTIVITY
WITHIN OIL AND GAS POTENTIAL AREAS (FIGURE 11)

	PARADOX BASIN							SAN JUAN BASIN						
	WC			DEV			SUB TOTAL	WC			DEV			GRAND TOTAL
	D&A	PWR	TOTAL	D&A	PWR	TOTAL		D&A	PWR	TOTAL	D&A	PWR	TOTAL	
Area 4	65	15	80	40	80	120	21	3	24	11	5	16	240	
Area 3	32	8	40	20	40	60	0	0	0	0	0	0	100	
Area 2	4	1	5	3	5	8	0	0	0	0	0	0	13	
Area 1	0	0	0	0	0	0	0	0	0	0	0	0	0	

APPENDIX B

APPENDIX 1

LANDS PROSPECTIVELY VALUABLE FOR LEASABLE MINERALS

Classification Criteria. Each leasable mineral has a unique set of limiting classification criteria, as set forth below, to identify lands prospectively valuable for that specific mineral.

Oil and Gas.

A. Approval Date. Criteria for classifying public lands as prospectively valuable for oil and gas were approved by the Director, USGS, on April 22, 1957. Those criteria have been revised and the new standards are presented herein. The approval date of the new classification criteria is the date of this Manual Release.

B. Criteria. Lands underlain by sedimentary rock shall be classified as prospectively valuable for oil and gas on the basis of the thickness and depth of sedimentary rocks, a favorable structural setting, and evidence of oil and gas potential. Although oil and gas normally occur within sedimentary rocks, these minerals may also accumulate in rocks of other than sedimentary origin. Classification of lands which do not contain sedimentary rocks should be based on knowledge of known accumulations. Such a determination requires considerable professional judgment.

1. Mineral thickness. In a sedimentary basin, the minimum thickness of sedimentary rocks considered to be prospectively valuable for oil and/or gas is 1,000 feet, unless a thinner sedimentary section is known to be productive.
2. Maximum depth. The lower depth limit of potentially productive sedimentary rock is considered to be 35,000 feet below the surface. Areas having a cover of igneous or metamorphic rock which has flowed or been thrust over sedimentary rock may be classified as prospectively valuable.
3. Evidence of oil and gas potential. Oil seeps, oil or gas shows in well tests, and past or present production constitute direct evidence of oil and gas potential. Indirect evidence may include seismic information, similarity with known producing rocks, or acceptable levels of thermal maturation. Either direct or indirect evidence may be used in classification.

POTENTIAL OF DEVELOPMENT

APPENDIX 2

OIL AND GAS POTENTIAL RATING CRITERIA

High, (a) in this area there is the demonstrated existence of: (1) source rock, (2) thermal maturation, and (3) reservoir strata possessing permeability and/or porosity, and (4) traps or (b) be part of an oil and gas play as defined by the USGS. (Open File Report 88-373 or related publication).

Moderate, there is a geophysical or geological indication that the following are present: (1) source rock, (2) thermal maturation and (3) reservoir strata possessing permeability and/or porosity, and (4) traps.

Low, there are specific indications that one or more of the following are not present: (1) source rock, (2) thermal maturation, or (3) reservoir strata possessing permeability and/or porosity, and (4) traps.

None, requires that the absence of source rock, or thermal maturation or reservoir rock prohibits the occurrence of oil and/or gas.



APPENDIX C

**STANDARD LEASE
TERMS AND
CONDITIONS**



APPENDIX C

STANDARD LEASE TERMS AND CONDITIONS

The standard terms and conditions for oil and gas leasing are part of all federal leases regardless of other considerations. These terms and conditions will automatically apply to all alternatives.

"Sec. 6. Conduct of Operations-Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee."

"Prior to disturbing the surface of the lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent to impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historical or scientific interest, or substantial unanticipated environmental effects

are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects."

The "lease rights granted," as used in this section have also been partially defined in the Code of Federal Regulations, part 3101.1-2, shown below.

A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease; restrictions deriving from specific, nondiscretionary statutes; and such reasonable measures as may be required by the Authorized Officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface-disturbing operations for a period in excess of 60 days in any lease year.

The lease form is shown as Figure C-1.

Figure C-1
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
OFFER TO LEASE AND LEASE FOR OIL AND GAS

Serial No. _____

The undersigned (*reverse*) offers to lease all or any of the lands in Item 2 that are available for lease pursuant to the Mineral Leasing Act of 1920, as amended and supplemented (30 U.S.C. 181 et seq.), the Mineral Leasing Act for Acquired Lands of 1947, as amended (30 U.S.C. 351-359), the Attorney General's Opinion of April 2, 1941 (40 Op. Atty. Gen. 41), or the

READ INSTRUCTIONS BEFORE COMPLETING

1. Name _____
Street _____
City, State, Zip Code _____
-
2. This application/offer/lease is for: (*Check only One*) ☐ PUBLIC DOMAIN LANDS ☐ ACQUIRED LANDS (percent U.S. interest _____)
Surface managing agency if other than BLM: _____ Unit/Project _____
Legal description of land requested: _____ *Parcel No.: _____ *Sale Date (m/d/y): _____ / _____ / _____
***SEE ITEM 2 IN INSTRUCTIONS BELOW PRIOR TO COMPLETING PARCEL NUMBER AND SALE DATE.**
T. _____ R. _____ Meridian _____ State _____ County _____

Amount remitted: Filing fee \$ _____

Rental fee \$ _____

Total acres applied for _____

Total \$ _____

DO NOT WRITE BELOW THIS LINE

3. Land included in lease:

T. _____ R. _____ Meridian _____ State _____ County _____

Total acres in lease _____

Rental retained \$ _____

This lease is issued granting the exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas (*except helium*) in the lands described in Item 3 together with the right to build and maintain necessary improvements thereupon for the term indicated below, subject to renewal or extension in accordance with the appropriate leasing authority. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this lease, the Secretary of the Interior's regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated when not inconsistent with lease rights granted or specific provisions of this lease.

NOTE: This lease is issued to the high bidder pursuant to his/her duly executed bid or nomination form submitted under 43 CFR 3120 and is subject to the provisions of that bid or nomination and those specified on this form.

Type and primary term of lease:

THE UNITED STATES OF AMERICA

☐ Noncompetitive lease (ten years)

by _____
(Signing Officer)

☐ Competitive lease (five years)

(Title)

(Date)

☐ Other _____

EFFECTIVE DATE OF LEASE _____

(b) Undersigned certifies that (1) offeror is a citizen of the United States, an association of such citizens, a municipality, or a corporation organized under the laws of the United States or of any State or Territory thereof; (2) all parties holding an interest in the offer are in compliance with §§ 3100 and 3101 of the Mineral Leasing Act, 30 U.S.C. 3100 and 3101; (3) offeror's chargeable interests, direct and indirect in either public domain or acquired lands do not exceed 246,080 acres in Federal oil and gas leases in the same State, of which not more than 200,000 acres are held under option, or 300,000 acres in leases and 200,000 acres in options in either leasing District in Alaska; (4) offeror is not considered a minor under the laws of the State in which the lands covered by this offer are located; (5) offeror is in compliance with qualifications concerning Federal coal lease holdings provided in sec. 2(a)(2)(A) of the Mineral Leasing Act; (6) offeror is in compliance with reclamation requirements for all Federal oil and gas lease holdings as required by sec. 17(g) of the Mineral Leasing Act; and (7) offeror is not in violation of sec. 41 of the Act.

(b) Undersigned agrees that signature to this offer constitutes acceptance of this lease, including all terms, conditions, and stipulations of which offeror has been given notice, and any amendment or separate lease that may include any land described in this offer open to leasing at the time this offer was filed but omitted for any reason from this lease. The offeror further agrees that this offer cannot be withdrawn either in whole or in part unless the withdrawal is received by the proper BLM State Office before this lease, an amendment to this lease, or a separate lease, whichever covers the land described in the withdrawal, has been signed on behalf of the United States.

This offer will be rejected and will afford offeror no priority if it is not properly completed and executed in accordance with the regulations, or if it is not accompanied by the required payments. 18 U.S.C. Sec. 1001 makes it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Duly executed this _____ day of _____, 19____.

(Signature of Lessee or Attorney-in-fact)

LEASE TERMS

Sec. 1. Rentals—Rentals shall be paid to proper officer of lessor in advance of each lease year. Annual rental rates per acre or fraction thereof are:

- (a) Noncompetitive lease, \$1.50 for the first 5 years; thereafter \$2.00;
 - (b) Competitive lease, \$1.50; for primary term; thereafter \$2.00;
 - (c) Other, see attachment;
- as specified in regulations at the time this lease is issued.

If this lease or a portion thereof is committed to an approved cooperative or unit plan which includes a well capable of producing leased resources, and the plan contains a provision for allocation of production, royalties shall be paid on the production allocated to this lease. However, annual rentals shall continue to be due at the rate specified in (a), (b), or (c) for those lands not within a participating area.

Failure to pay annual rental, if due, on or before the anniversary date of this lease (or next official working day if office is closed) shall automatically terminate this lease by operation of law. Rentals may be waived, reduced, or suspended by the Secretary upon a sufficient showing by lessee.

Sec. 2. Royalties—Royalties shall be paid to proper officer of lessor. Royalties shall be computed in accordance with regulations on production removed or sold. Royalty rates are:

- (a) Noncompetitive lease, 12 1/2 %;
- (b) Competitive lease, 12 1/2 %;
- (c) Other, see attachment;

as specified in regulations at the time this lease is issued.

LESSOR reserves the right to specify whether royalty is to be paid in value or in kind, and the right to establish reasonable minimum values on products after giving lessee notice and an opportunity to be heard. When paid in value, royalties shall be due and payable on the last day of the month following the month in which production occurred. When paid in kind, production shall be delivered, unless otherwise agreed to by lessor, in merchantable condition on the premises where produced without cost to lessor. Lessee shall not be required to hold such production in place beyond the last day of the month following the month in which production occurred, nor shall lessee be held liable for loss or destruction of royalty oil or other products in storage from causes beyond the reasonable control of lessee.

Minimum royalty in lieu of rental of not less than the rental which otherwise would be required for that lease year shall be payable at the end of each lease year beginning on or after a discovery in paying quantities. This minimum royalty may be waived, suspended, or reduced, and the above royalty rates may be reduced, for all or portions of this lease if the Secretary determines that such action is necessary to encourage the greatest ultimate recovery of the leased resources, or is otherwise justified.

An interest charge shall be assessed on late royalty payments or underpayments in accordance with the Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA) (30 U.S.C. 1701). Lessee shall be liable for royalty payments on oil and gas lost or wasted from a lease site when such loss or waste is due to negligence on the part of the operator, or due to the failure to comply with any rule, regulation, order, or citation issued under FOGRMA or the leasing authority.

Sec. 3. Bonds—A bond shall be filed and maintained for lease operations as required under regulations.

Sec. 4. Diligence, rate of development, unitization, and drainage—Lessee shall exercise reasonable diligence in developing and producing, and shall prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessee shall drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by lessor.

Sec. 5. Documents, evidence, and inspection—Lessee shall file with proper officer of lessor, not later than 30 days after effective date thereof, any contract or evidence of other arrangement for sale or disposal of production. At such times and in such form as lessor may prescribe, lessee shall furnish detailed statements showing amounts and quality of all products removed and sold, proceeds therefrom, and amount used for production purposes or unavoidably lost. Lessee may be required to provide plans and schematic diagrams showing development work and improvements, and reports with respect to parties in interest, expenditures, and depreciation costs. In the form prescribed by lessor, lessee shall keep a daily drilling record, a log, information on well surveys and tests, and a record of subsurface investigations and furnish copies to lessor when required. Lessee shall keep open at all reasonable times for inspection by any authorized officer of lessor, the leased premises and all wells, improvements, machinery, and fixtures thereon, and all books, accounts, maps, and records relative to operations, surveys, or investigations on leased lands. Lessee shall maintain and file with lessor all contracts, sales agreements, accounting records, and documentation such as billings, invoices, or similar documentation that supports

costs claimed as manufacturing, preparation, and/or transportation costs. All such records shall be maintained in lessee's accounting offices for future audit by lessor. Lessee shall maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor.

During existence of this lease, information obtained under this section shall be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 6. Conduct of operations—Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with the rights of lessee.

Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects.

Sec. 7. Mining operations—To the extent that impacts from mining operations would be substantially different or greater than those associated with normal drilling operations, lessor reserves the right to deny approval of such operations.

Sec. 8. Extraction of helium—Lessor reserves the option of extracting or having extracted helium from gas production in a manner specified and by means provided by lessor at no expense or loss to lessee or owner of the gas. Lessee shall include in any contract of sale of gas the provisions of this section.

Sec. 9. Damages to property—Lessee shall pay lessor for damage to lessor's improvements, and shall save and hold lessor harmless from all claims for damage or harm to persons or property as a result of lease operations.

Sec. 10. Protection of diverse interests and equal opportunity—Lessee shall: pay when due all taxes legally assessed and levied under laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain safe working environment in accordance with standard industry practices; and take measures necessary to protect the health and safety of employees.

LESSOR reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly. If lessee operates a pipeline, or owns a controlling interest in a pipeline or a company operating a pipeline, which may be operated accessible to oil derived from these leased lands, lessee shall comply with section 28 of the Mineral Leasing Act of 1920.

Lessee shall comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessee nor lessor's subcontractors shall maintain segregated facilities.

Sec. 11. Transfer of lease interests and relinquishment of lease—As required by regulations, lessee shall file with lessor any assignment or other transfer of an interest in this lease. Lessee may relinquish this lease or any legal subdivision by filing in the proper office a written relinquishment, which shall be effective as of the date of filing, subject to the continued obligation of the lessee and surety to pay all accrued rentals and royalties.

Sec. 12. Delivery of premises—At such time as all or portions of this lease are returned to lessor, lessee shall place affected wells in condition for suspension or abandonment, reclaim the land as specified by lessor and, within a reasonable period of time, remove equipment and improvements not deemed necessary by lessor for preservation of producible wells.

Sec. 13. Proceedings in case of default—If lessee fails to comply with any provisions of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease shall be subject to cancellation unless or until the leasehold contains a well capable of production of oil or gas in paying quantities, or the lease is committed to an approved cooperative or unit plan or community unit plan agreement with the lessor, or the well capable of production of oil or gas in paying quantities, this provision shall not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver shall not prevent later cancellation for the same default occurring at any other time. Lessee shall be subject to applicable provisions and penalties of FOGRMA (30 U.S.C. 1701).

Sec. 14. Heirs and successors-in-interest—Each obligation of this lease shall extend to and be binding upon, and every benefit hereof shall inure to the heirs, executors, administrators, successors, beneficiaries, or assignees of the respective parties hereto.

Discretionary No Lease Areas For Standard Terms and Conditions Alternative

GSRA -		
	Rifle falls and Glenwood Springs Fish Hatcheries	690 Acres
	Deep Creek	2,400
	Bull Gulch	9,900
	Thompson Creek	4,300
	Hack Lake	3,100
	Rifle Mountain Park	400
	Sunlight Peak	1,900
	Eagle River SRMA	1,800
	Colorado River SRMA	<u>13,144</u>
		37,634
KRA -		
	Kremmling Cretaceous Ammonite	200
	North Park Phacelia	300
	Windy Gap Cultural	400
	Colorado River SRMA	4,870
	North Sand Hills	<u>1,325</u>
		7,095
LSRA -		
	Greater Sand Hill Crane	100
	Limestone Ridge	1,350
	Cross Mountain Canyon	3,000
	Little Yampa/Juniper Canyon	19,800
	Cedar Mountain	880
	Steamboat Lake State Park	385
	Pearl Lake State Park	<u>270</u>
		25,785
NPA -		
	Military Bases	125,000
	State, County & City Parks (outside incorporated areas)	15,000
	Reservoir/Railroad ROWs, Riparian Areas	<u>60,000</u>
		200,000
SJ/SMPA -		
	Anasazi Cultural Area	30,565
	Bridge Canyon	443
	Menefee & Weber Mountains	8,720
	Sand & East Rock Canyons	5,880
	Squaw/Papoose,Cross,& Cahone Canyons	28,464
	Hovenweep Buffer Zone	600
	Cutthroat Castle Buffer	320
	Horse Range Mesa	<u>40</u>
		75,032

Grand Total 345,546

APPENDIX D

**CONDITIONS OF
APPROVAL—
ALL ALTERNATIVES**



APPENDIX D

CONDITIONS OF APPROVAL COMMON TO ALL ALTERNATIVES

Mitigation Authority: Lease Rights Statement and Section 6 of Oil and Gas Lease Form

Introduction

Post-lease operations proposals are reviewed to ensure conformance with the plan. The mitigative measures listed in this appendix represent the post-lease environmental protection to which the BLM is committed as a result of the analysis in the plan/EIS. Note that there is no commitment to the specific wording of a Condition of Approval (COA).

The listed mitigative measures may apply to all oil and gas exploration and development activities and associated rights-of-way for all three alternatives. The Authorized Officer will choose among these measures at the field development stage to mitigate or avoid environmental impacts identified on a site specific basis. When attached to an approval document, the measures are known as COAs. The Authorized Officer is not limited to the list of COAs shown here, but may develop others as unforeseen impacts occur so long as the new COAs conform with the limitations of the granted lease rights and the guidance set forth in this plan and subsequent amendments.

In addition to the COAs shown here others are derived from lease stipulations in the Proposed Action and Continuation of Present Management Alternatives. The application of those COAs will depend upon the alternative chosen in the Record of Decision. The COAs shown in this Appendix apply to all three alternatives, and will apply to the alternative chosen in the Record of Decision.

COAs are not added to applications if they are unnecessary (do not apply to the case in question) or, are duplicative, as when the

mitigative measure is already incorporated in the operator's submittal.

GEOPHYSICAL OPERATIONS

The following guidance is for the development of standards to be attached, as appropriate, to the Notice of Intent (NOI) for geophysical operations at the discretion of the Authorized Officer and in accordance with the Resource Management Plan/Environmental Impact Statement (RMP/EIS) Record of Decision. The statements below will be used as guidance by BLM field personnel in determining what protective measures will be used on geophysical operations. Only those items pertaining to a given operation will be appended to the NOI, and only if they are not already contained in the proposed plan of operation.

A. NOTIFICATION

If noncompliance with terms and conditions occurs, the operator will be notified by BLM and instructed as to the appropriate action. If the operator fails to take appropriate action, the operator will be subject to enforcement action in accordance with 43 CFR 3163.

Wildfires begun or sighted during seismic operations will be reported immediately to the Grand Junction Fire Dispatch Office at 303/243-6555 and the Resource Area Office of jurisdiction. The operator is liable for the full cost of fire suppression of all fires on or in the vicinity of the project set or caused by his employees, whether set directly or indirectly as a result of operations.

The operator shall notify the Authorized Officer, or his representative at least 48 hours prior to beginning operations. The operator shall also report progress on a weekly basis

APPENDIX D

until completion. A pre-work conference may be required.

Immediately upon completion of operations, a Notice of Completion of Oil & Gas Exploration Operations and an updated BLM planimetric map or USGS topographic map showing revisions to the original NOI shall be submitted to the Authorized Officer. The map will be used to perform a final compliance inspection of the exploration area.

A copy of all COAs, along with a copy of the submitted NOI, shall be kept in the field by each seismic crew, for inspection by BLM personnel.

Any exploration greater than 1/4 mile from the proposed seismograph line route filed with the NOI will require prior approval from the Authorized Officer.

B. AGENCY RESPONSIBILITIES

The Authorized Officer will notify all affected District Wildlife Managers or Area Supervisors (Colorado Division of Wildlife) and livestock operators prior to commencement of seismic operations. This notice will contain information as to the expected timing, location, and type of exploration conducted.

C. CULTURAL RESOURCES

The Programmatic Agreement between the BLM, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation, signed February 6, 1987, contains guidance for oil and gas, seismic, and other land use operations. Appendix B of the agreement specifically outlines BLM procedures for both oil and gas APDs and for seismic operations. In addition, guidance is provided in: "Handbook for Cultural Resources Inventory/Mitigation" (Colorado State Office Release 8-13), dated 1990.

In addition to the above guidance, the operator shall immediately bring to the attention of the Authorized Officer any and all antiquities or other objects of historic, paleontological, or scientific interest, including, but not limited to, prehistoric or historic ruins or artifacts discovered as a result of operations. The operator and the Authorized Officer shall consult and

determine the best option for avoiding or mitigating site damage.

Operators are also reminded that the removal, injury, defacement, or alteration of any object of scenic, archaeological, historical, or scientific interest is a federal crime and may be punishable by fine and/or jail terms.

D. THREATENED, ENDANGERED, AND SENSITIVE SPECIES

An inventory for threatened and endangered plant species is required on any portions of the line or staging areas proposed in known or realistic potential habitat for threatened, endangered, or candidate plant species. A map will be maintained by the BLM outlining these areas and made available to the public.

E. CONSTRUCTION

All infestations of noxious or poisonous weeds, resulting from surface disturbance caused by the operator, will be controlled before spreading occurs into the surrounding area. Method of weed control will be reviewed by the Authorized Officer prior to commencement.

No dirt work or clearing of vegetation will occur without specific approval. All merchantable timber and/or firewood shall be purchased by the operator at the total appraised price that is determined by the BLM.

During periods of adverse conditions such as thawing, heavy rains, snow, or flooding, all activities off existing maintained roads that create excessive surface rutting will be suspended. When adverse conditions exist, the operator will contact the Authorized Officer for an evaluation and decision based on soil type, slope, vegetation, and cover.

Drill hole cuttings will be returned to the hole if possible, or at a minimum, raked and spread out so as not to impede regrowth of vegetation or to create erosion problems.

Operations shall be done in a manner which prevents damage, interference, or disruption of water flows and improvements associated with all springs, wells, or impoundments. It is the operator's responsibility to enact the

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precautions necessary to prevent damage, interference, or disruptions. Vibrator sources will not be operated closer than 300 feet, and large explosive charges, greater than 40 pounds, will not be used closer than 1,320 feet of springs, wells, or impoundments. The Authorized Officer may approve closer source distances if the contractor demonstrates that the resource will be protected.

No fence will be cut unless no other alternative exists. Before cutting through any fences, the operator shall firmly brace the fence on both sides of the cut; a temporary gate will be installed for use during the course of operations unless the fence is immediately repaired. Upon completion of operations, fences shall be restored to at least their original condition.

Activities of the seismic operators shall not prevent, obstruct, or unduly interfere with any activities of other authorized users of the public lands. Removal or alteration of existing improvements (fences, cattle guards, etc.) is not allowed without prior approval. Fences are to be braced to BLM's standards prior to cutting them.

All debris, such as paper, cans, wire, flagging, or other trash, shall be removed and properly disposed of upon completion. No oil or lubricants shall be drained onto the ground.

All vehicles (including drills) will be limited to existing roads, except in approved areas. Improvement of existing roads and trails is not permitted, unless prior approval is obtained.

Water for drilling purposes will not be obtained from federally owned or controlled water sources such as reservoirs and springs unless specific permission is obtained from the Authorized Officer.

Any available information concerning water sands or artesian flows must be reported to the Resource Area Office.

Whenever possible, a portable mud pit shall be used when drilling with fluids.

There will be no straight line of sight dozing. Any path dozed through a timbered area will take an irregular path. Any pushed trees are

to be stockpiled adjacent to the line so they are readily retrievable without additional disturbance. All trees are to be pulled and spread back onto the line or access route.

Tall brush, sagebrush parks and open areas: There will be no removal of brush or grass by blading. Brush may be crushed or removed by keeping the blade six inches off the ground surface. In open or brush areas, vehicle paths will take an irregular path to discourage line of sight paths.

Improvement of existing roads or trails: Blading will be allowed only if the trail is impassable by vehicles or geophysical equipment. No widening or realignment will be allowed. Existing trails may have to be reclaimed or closed.

New trails can be constructed only when vehicle and equipment passage is impossible and only with the concurrence of the Authorized Officer. No straight line of sight trails will be allowed. All trails will be reshaped to original contour (including bench cuts). Waterbars will be placed on slopes as directed by the Authorized Officer.

Construction of drainage crossings which cannot otherwise be crossed: Existing fords are to be used if possible. A cut and stockpile process will be used to create a low water crossing or upgrade an existing crossing unless otherwise specified by the Authorized Officer.

F. EXPLOSIVES

Powder magazine sites on public lands must be approved in writing by the Area Manager prior to use. The transportation, storage, and use of explosives on BLM surface will be done in accordance with ATF P 5400.7 (11/82).

G. RIGHTS-OF-WAY

Access to federal lands across non-federal lands is not guaranteed by the government. Permission to enter or cross private, or state-owned lands must be obtained from the landowner(s).

H. MISCELLANEOUS

All personnel (contractors, subcontractors) working in the field with the seismic operator

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will be familiar with and follow the conditions appended to the NOI.

Helicopters will operate between staging areas and seismic line within corridors and at altitudes that allow safe, efficient, and environmentally sensitive operations. Operating parameters will be determined on a line-to-line basis as mutually agreed by BLM, helicopter operator, and contractor.

Aircraft landing sites on public lands must be approved in writing by the Area Manager prior to use.

No helicopter or motor vehicle use would be allowed in the Wild Horse Herd Management Areas March 2 - June 30; foaling season for wild horses. BLM will maintain an area map for contractor inspection.

Between the hours of 4 pm and 10 am, no geophysical exploration operations are permitted within a one-mile radius of (Water Source) located at (Location) to allow wild horses uninhibited and undisturbed use of their critical drinking water source from March 1 to December 1. This is the period of no snow availability for wild horse use.

I. RECLAMATION

All surface disturbance would be recontoured and revegetated according to an approved reclamation plan.

Reclamation of disturbed areas shall be completed, as directed by the Authorized Officer, within 30 days of terminating seismograph work on any line. Delay of reclamation for any reason, such as weather, must be approved by BLM. Adequate vegetative cover (and seed mixture, based on site-specific analysis, to be used) shall be established by the Authorized Officer.

APPLICATION FOR PERMIT TO DRILL OPERATIONS

The following guidance will be used to develop COAs which are attached, as appropriate, to approved APDs, Sundry Notices, or oil and gas related right-of-way actions at the discretion of the Authorized Officer and in accordance with the RMP/EIS Record of Decision.

This appendix shows the most common COAs used; however, the reader is reminded that COAs are designed for specific operations. In practice, COAs shown below may or may not be used on any given approval document, and other COAs, not specifically stated here, will be written to accomplish the tasks envisioned in this plan. The categories shown below are a good representation of the list of mitigative measures considered by BLM resource specialists for every approved field operation.

A. NOTIFICATION

In order for BLM inspectors to check the initial construction operations, it is necessary that the BLM be notified when construction begins. To help insure that all parties understand the requirements for construction, the operator must assure that all employees and sub-contractors are adequately aware of the COAs. Examples of such notification requirements are shown below:

The operator or his contractor will contact the approving Resource Area Office 48 hours before beginning any work on public land.

The operator will give the dirt contractor a copy of the Surface Use Plan and any additional BLM COAs before any work begins. A copy of the approved Surface Use Plan will be available on-site for inspection during construction.

The operator or his contractor will contact the approving Resource Area office 48 hours before starting reclamation work and within 48 hours of completion of reclamation work.

Proper precautions shall be taken at all times to prevent or suppress fires. Range or forest fires will be reported to the BLM District or Resource Area Office. All other fires or explosions that cause damage to property, equipment, loss of oil or gas, or result in injuries to personnel will be reported to the Authorized Officer.

B. OTHER AGENCY APPROVALS

Some operations on public lands affect adjoining private lands and require approval by state, local, or other federal agencies. It is solely the responsibility of the operator to be aware of these requirements and gain the

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necessary approvals. Upon notification by another agency of operators failure to obtain necessary permitting, a notice of noncompliance will be issued and operations may be suspended. In a few cases, the BLM wants to make it clear that the "BLM approved" operations may not proceed until such approval is granted. In those cases, a COA is appended to the approved application such as: Use of water for operations will be approved by obtaining a temporary use permit from the Colorado State Water Resources Engineer and by receiving permission from the landowner or surface managing agency to use the land containing the water source.

C. CULTURAL RESOURCES

The Programmatic Agreement between the BLM, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation, signed February 6, 1987, contains guidance for oil and gas, seismic, and other land use operations. Appendix B of the agreement specifically outlines BLM procedures for both oil and gas APDs and for seismic operations. In addition, guidance is provided in: "Handbook for Cultural Resources Inventory/Mitigation" (Colorado State Office Release 8-13), dated 1990.

In addition to the above guidance, the operator shall immediately bring to the attention of the Authorized Officer any and all antiquities or other objects of historic, paleontological, or scientific interest, including, but not limited to, prehistoric or historic ruins or artifacts discovered as a result of operations. The operator and the Authorized Officer shall consult and determine the best option for avoiding or mitigating site damage.

Operators are also reminded that the removal, injury, defacement, or alternation of any object of scenic, archaeological, historical, or scientific interest is a federal crime and may be punishable by fine and/or jail terms.

D. THREATENED, ENDANGERED, AND SENSITIVE SPECIES

The lessee may be required to provide inventory information for certain species if it is determined that inadequate information is

available to make appropriate decisions relating to mitigation. These species could involve threatened, endangered, sensitive and/or rare plant or animal species, or other species protected by law or of high interest, such as bighorn sheep lambing areas, elk calving areas, raptors, etc.

Apply "Suggested Practices for Raptor Protection on Power lines" on all proposed transmission lines to be constructed to insure they are properly grounded to prevent unnecessary electrocution of raptors.

The locations of all known populations of Colorado BLM sensitive plants and selected high priority remnant vegetation associations would be protected from human-induced surface disturbing activities to the extent such protection does not unduly hinder or preclude exercising valid existing rights. The area of protection will include the actual location of the populations or occurrences of important vegetation associated to receive protection, and shall be determined in consultation and coordination with the Colorado Natural Areas Program (CNAP).

Those populations/occurrences, upon which analysis determines protection to be necessary, shall be protected by: 1) requiring relocation or rerouting of proposed well sites, pipelines, roads, other surface facilities, etc., or 2) applying other protective mitigation (i.e., fencing). BLM will effectively mitigate potential impacts to important populations/occurrences to the degree that existing development rights are not unduly hindered or precluded.

E. RESOURCES (OTHER THAN OIL AND GAS)

Wind swept ridges and pinyon-juniper areas within identified wild horse areas will be avoided where necessary to insure availability of winter forage and year-round shelter for wild horses.

Surface-disturbing activities within or adjacent to intermittent or perennial water sources, associated floodplains, and riparian areas will only be allowed where mitigative measures can be employed to protect floodplains, water quality, and riparian values.

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Well pads, roads, and facilities will be constructed and maintained to avoid unnecessary impacts to air quality.

Raptor and sandhill crane nests will be protected from human-induced surface-disturbing activities to the extent such protection does not unduly hinder or preclude exercising valid existing rights.

All trees requiring removal shall be disposed of by the operator. Where earth blading is required, stumps shall be removed and scattered or buried in an area designated by the Authorized Officer. Where earth blading is not required, stump height shall not exceed 12 inches. A wood permit from BLM for the wood removed (for the appraised value) will be required prior to any clearing.

Water sources used by wild horses will be avoided, unless otherwise approved by the Authorized Officer.

Water wells drilled to provide water for drilling purposes will be approved by, and offered to, the BLM for use prior to plugging the water well. Water rights will be held by the BLM. The BLM will be notified of any water aquifers encountered during drilling which could be developed for water prior to final plugging of the well.

All operations will be conducted so as not to cause pollution or change the character of streams, lakes, ponds, water holes, seeps, or marshes. This relates directly to damages caused to fish and wildlife resources. Surface disturbance that causes active soil movement will be corrected.

F. CONSTRUCTION

Linear-type facilities such as roads, power lines, and pipelines shall cohabit and follow a common route unless otherwise approved by the Authorized Officer. Surface disturbance will be minimized.

Well pads, roads, and facilities will be located to minimize visual impacts.

To protect watersheds from accelerated erosion, increased slumping, and increased sediment and salinity loading, all development activities may be curtailed at the discretion of the Authorized Officer during periods when the soil is saturated.

Trash and garbage must be contained in an closed receptacle or in an earthen pit. If an earthen pit is used, it must be covered to prevent contents from escaping. Burning and/or burying is not authorized. Contents from a trash receptacle or pit must be hauled to an approved county landfill. This pertains to all phases of lease operations.

Surface disturbance and vehicular travel will be limited to the approved location and approved access route. Any additional area needed must be approved in advance.

Above-ground facilities will be painted to blend with the surrounding environment using a specified color from the Rocky Mountain Regional Committee Standard Environmental Color chart.

a. Roads (On Lease)

Existing roads should be used to the extent possible. Additional roads, if needed, shall be kept to an absolute minimum and the location of routes must be approved by BLM prior to construction. Upon determination of an impending field development, a transportation plan will be requested to reduce unnecessary access roads. Roads will be constructed and maintained to BLM road standards (BLM Manual Section 9113) unless otherwise authorized by the Authorized Officer.

Companies controlling roads which provide access into crucial wildlife areas may be required to close the road with a lockable gate to prevent general use of the road during critical periods of the year when resource problems are experienced (during hunting seasons, winter, etc.). This restrictive measure would be applied where needed to protect wildlife resources or to minimize environmental degradation.

Use of closed road segments will be restricted to legitimate, authorized agents of: 1) the lessee and/or their subcontractor(s), 2) the BLM, 3) other agencies with a legitimate need (CDOW, other law enforcement agencies, etc.). Unauthorized use or failure to lock gates during specified time frames by the lessee or its subcontractors would be considered a violation of the terms of the APD or associated grants. This would apply to BLM roads and other roads on public lands.

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Improvement or upgrading of existing roads and trails shall conform to the same requirements as the approval APD.

The operator shall regularly maintain all roads used for access to the lease operation. This shall include installation of additional surfacing and surface drainage control structures whose need was not foreseen during construction.

At cessation of operations, the Authorized Officer will decide which roads will be closed and rehabilitated and which will remain open for public use.

Any access routes that had been previously available to the public will not be unnecessarily blocked off from public use.

Cattle guards heavy enough to handle proposed road traffic will be installed whenever access roads are through pasture gates or fences. These cattle guards shall be maintained on a regular basis to assure their effectiveness at turning livestock. This includes cleaning out under cattle guard bases when needed.

Improvement to existing access will be necessary and limited to a 14-foot crowned and ditched road surface with turnouts as needed and minimum disturbance of surrounding soil and vegetation (abrupt back sloped borrow ditch). New construction will be limited to the same specifications as above. Cleared trees and brush along the road right-of-way will be wind-rowed to the side in convenient clearings. Surfacing material will not be placed on the access road or location without prior BLM approval.

Waterbars: The operator will be required to construct waterbars on abandoned roads and pipeline routes. General guidelines for installation of waterbars are: less than two percent grade--200-foot spacing, four to five percent grade--75-foot spacing, greater than five percent grade--50-foot spacing. Unstable soils may require a closer spacing, whereas the spacing may be greater on stable soils and rock outcroppings. The waterbars shall be constructed to drain freely to the natural ground level and to prevent siltation and clogging.

New roads constructed for oil and gas purposes within crucial big game winter

range and isolated and/or roadless areas will be reclaimed upon completion of the oil and gas operation.

New oil and gas roads on public lands within crucial big game winter range will be closed to the public from December 15 to April 30.

New roads on public lands within isolated and/or roadless areas will be closed to the public year-round.

b. Pads

Selecting Locations for Well Sites, etc.: In planning for well sites, tank batteries, sump, reserve and mud pits, and pumping stations, the operator shall select locations that involve the least disruption to scenic values and other surface resources. The operator shall employ construction techniques and design practices, including selection of material, camouflage techniques, and rehabilitation practices that will preserve scenic aesthetic qualities. The following guidelines can be used by operators to assist in minimizing surface disturbance and as an aid in the maintenance of the best possible conditions for rehabilitation.

Construction: Steep slopes shall be avoided, the site shall be located on the most level location obtainable that will accommodate the intended use.

View the site location as to how it will affect the road location. What may be gained on a good location may be lost from an adverse access route.

Adjust the site layout to conform to the best topographic situation. Deep vertical cuts and steep long fill slopes should be avoided. All cut and fill slopes should be constructed to the least percent slope practical.

The top 12 inches of soil material will be removed from the location and stockpiled separate from the trees on the location. Topsoil along the access will be reserved in place.

c. Pits (All)

Excavations used for the permanent impoundment of usable water should be sloped at a 3:1 grade to establish safe access for humans, livestock, and wildlife.

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A minimum of two feet of free board will be maintained between the maximum fluid level and the top of the berm. These pits will be designed to exclude all surface runoff. The pits will have the maximum volume in cut.

Prior to closure, a randomly selected sample of drilling pits within established fields will be sampled for hazardous materials. In wildcat wells, all pits will be sampled for hazardous materials prior to abandonment, unless specifically exempted by the Authorized Officer. Sampling will be done by an independent contractor agreeable to the operator and Authorized Officer. Testing will be done at a lab with quality control standards acceptable to USGS.

Final written certification is required that there are no hazardous chemicals on the RCRA list left in the drilling fluids within the mud pit. If the operator cannot provide certification, the drilling fluids and pit liner must be disposed at a federally approved hazardous materials site.

Reserve and other containment pits that are used during the exploration and/or operation of the lease may require fences and/or other devices to exclude migratory birds, livestock, and/or wildlife. The need and type of protective requirement will be determined on a case-by-case basis.

All pits, cellars, rat holes, and other bore holes unnecessary for further lease operations, excluding the reserve pit, will be back-filled immediately after the drilling rig is released to conform with surrounding terrain. Pits, cellars and/or bore holes that remain on location must be fenced as specified for the reserve pit.

Reserve pit fluids will be allowed to evaporate through the entire summer season (June-August) after drilling is completed, unless an alternate method of disposal is approved. After the fluids disappear, the reserve pit muds will be allowed to dry sufficiently to allow back-filling. The back-filling of the reserve pit will be done so that the muds and associated solids will be confined to the pit and not squeezed out and incorporated in the surface materials. There will be a minimum of three feet of cover (overburden) on the pit. When the work is complete, the pit area will support the weight of heavy equipment without sinking.

Semi-closed or closed mud systems may be required where conditions warrant. Produced water will be injected, contained in a lined pit, or hauled to a federally approved disposal facility.

Closed Pits

Installed pit liners must be impermeable and must be resistant to weather, sunlight, hydrocarbons, aqueous acids, alkalis, salt, fungi, or other substances likely to be contained in the drilling fluids or produced water.

The reserve pit liner will be of sufficient strength and construction to insure impermeability. The liner will be underlain by a suitable bedding material and other measures taken as needed to protect the integrity of the liner.

A leak detection system will be installed to monitor lined reserve pits. This system must be installed in order to detect liner leakage. The leak detection plan must be submitted to and approved by the Authorized Officer during APD approval. This plan must include the system design including line installation, monitoring plan, and the individual responsible for the required monitoring.

For lined pits, the liner and contents will be buried in place and effectively capped with clay or other impermeable materials, or disposed of in a non-polluting method acceptable to the Authorized Officer.

If air or gas drilling, the operator shall control the blooie line discharge dust by use of water injection or any other acceptable method. The blooie line discharge shall be a minimum of 100 feet from the blow out preventer and be directed into the blooie pit so that the cuttings and waste are contained in the pit.

d. Pipelines

Alignment, siting, and reclamation of pipelines and flow-lines should be designed to conform to adjacent terrain and to prevent or minimize vehicular travel. If maintenance is necessary in problem areas, consider use of an all terrain vehicle (ATV) or snowcat etc., in lieu of regular truck. Surface disturbance for pipeline construction would be restricted to the minimum amount

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necessary, as determined by the Authorized Officer. Relocation of portions of the line may be necessary to reduce the impact to surface resources.

For associated pipeline rights-of-way, except rights-of-way expressly authorizing a road after construction of the facility is complete, the right-of-way holder shall not use the right-of-way as a road for purpose other than routine maintenance. Necessary routine maintenance will be determined through consultation with the Authorized Officer.

Existing telephone, telegraph, power lines, pipelines, roads, trails, fences, ditches, and like improvements shall be protected during construction, operation, maintenance, and termination of an oil and gas facility. Damage caused by such activities shall be properly repaired to a condition which is satisfactory to the Authorized Officer or the facility owner/operator.

Pipeline routes will be graded to conform to the adjacent terrain, waterbarred, and reseeded.

When clearing is necessary, the width disturbed will be kept to a minimum. Bladed materials shall be placed back into the cleared route upon completion of construction.

Pipeline construction shall not block, dam, or change the natural course of any drainage. Suspended pipelines will provide adequate clearance for runoff.

Pipeline trenches shall be compacted during back-filling. These trenches will be maintained in order to correct settlement and prevent erosion. Waterbars and other erosion control devices will be repaired as necessary.

Pumping stations shall be kept in a neat and well-maintained condition.

Abandonment and Rehabilitation: Reclamation and abandonment of pipelines and flow-lines may involve: replacing fill in the original cuts, reducing and grading cut and fill slopes to conform to the adjacent terrain, replacement of surface soil material, waterbarring, and revegetating in accordance with rehabilitation practices.

Crossing of pipelines owned by other companies shall be accomplished in

accordance with an agreement secured with that company.

G. DRILLING

Water for drilling purposes will not be obtained from federally owned or controlled water sources such as reservoirs and springs unless specified permission is obtained from the Area Manager.

The BLM will be notified of any water aquifers encountered during drilling which could be developed for water prior to final plugging of the dry hole. Water rights will be held by the BLM.

H. PRODUCTION

Compaction and construction of the berms surrounding tank batteries will be constructed prior to storage of fluids and designed to prevent lateral movement of fluids through the utilized materials. The berms must be constructed to contain at minimum 120 percent of the storage capacity of the largest tank within the berm. All loading lines will be placed inside the berm.

Other Guidelines: Surface buildings, supporting facilities, and other structures, which are not required for present or future operations, shall be removed upon termination of use.

All improvements, including fences, gates, cattle guards, roads, trails, pipelines, bridges, water developments, and control structures will be maintained in a serviceable and safe condition.

Any release of production water on or across the land will need prior approval by the BLM.

Mud, separation pits, and other containments used during the exploration or operation of the lease for the storage of oil and other hazardous materials shall be adequately fenced, posted, or covered. Additional protective measures may be needed to minimize hazards and prevent access to humans, livestock, waterfowl, and other wildlife. The pits should be allowed to dry before back-filling and rehabilitation.

All production and storage facilities must have adequate protection from spills. The

APPENDIX D

Spill Prevention Control and Countermeasure Plan required by the Environmental Protection Agency must be available for inspection at all appropriate field offices. All spills must be reported to the Authorized Officer.

The reserve pit and that portion of the location and access road not needed for production or production facilities will be reclaimed as described in the reclamation section. Enough topsoil will be kept to reclaim the remainder of the location at a future date. This remaining stockpile of topsoil will be seeded in place using the prescribed seed mixture.

A gate may be required to limit public access during the wildlife winter use periods (December 1 - April 15) when the operator maintains a road open for winter use.

If the well is located within 2,500 feet (1/2 mile) of residences, appropriate noise mitigation (i.e., hospital muffler, vegetation screening, electric motors, etc.) will be employed to ensure that federal, state, and local noise standards are adhered to during operation of the well.

Within 60 days of completion of construction, the holder shall provide the Authorized Officer an as-built survey of facilities as constructed.

I. RECLAMATION

All disturbed areas not needed for lease operations will be revegetated as soon as possible. The operator will re-establish perennial vegetation that is compatible to surrounding undisturbed vegetation. The plant species to be seeded and the seeding rate will be approved by the Authorized Officer prior to seeding. Successful revegetation will be considered completed when the percent canopy cover is equal to surrounding undisturbed vegetation. The species considered in measuring percent cover will be those seeded as well as desirable preexisting species. Undesirable weedy species such as kuchia, cheatgrass, and other noxious weeds will not be included unless otherwise directed by the Authorized Officer. The operator will continue revegetation efforts using any and all cultural methods available until this standard is met.

Noxious weeds which may be introduced due to soil disturbance and reclamation will be treated by methods to be approved by the Authorized Officer. These methods may include biological, mechanical, or chemical. Should chemical methods be approved, the lessee must submit a Pesticide Use Proposal to the Authorized Officer 60 days prior to the planned application date.

In the event a producing well is developed, the unused disturbed areas surrounding the well location will be recontoured to appropriate conformation (one which allows lease operations and avoids steep cut and fill slopes) as soon as possible. Some or all of the stockpiled topsoil will be evenly disturbed over these recontoured areas. Brush cleared prior to construction of the well site shall be scattered back over the recontoured area.

Mulching of the seed-bed following seeding may be required under certain conditions (i.e., expected severe erosion), as determined by the surface owner/manager.

Surface top soil-like material, if available, will be stripped from all areas where surface disturbance is necessary and stockpiled in a manner and location that will allow easy replacement. These stockpiles shall be protected from loss. After reshaping the site, soil material should be distributed to a uniform depth that will allow the establishment of desirable vegetation. The disturbed areas shall be scarified prior to replacement of surface soil material.

All disturbed areas will be recontoured to blend as nearly as possible with the natural topography. This includes removing all berms and refilling all cuts. All compacted portions of the pad will be ripped to a depth of 12 inches unless in solid rock.

After revegetation is complete, the stockpiled trees will be scattered evenly over the disturbed areas. The access will be blocked to prevent vehicular access.

Seed certification tags will be submitted to the Authorized Officer for seed used in reclamation.

Prior to abandonment of the facilities authorized by this grant, the holder shall contact the Authorized Officer to arrange a joint inspection of the right-of-way. The

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inspection will be held to agree on an acceptable abandonment and rehabilitation plan. The Authorized Officer must approve the plan in writing prior to the holder commencing any abandonment and/or rehabilitation activities. The plan may include removal of surfacing material from the road, recontouring, replacement of topsoil, seeding, mulching, etc.

Cut and fill slopes shall be reduced and graded to conform the site to the adjacent terrain. The disturbed sites will be prepared to provide a seed-bed for re-establishment of desirable vegetation and reshaped to blend with the natural contour. Such practices may include contouring, terracing, gouging, scarifying, mulching, fertilizing, seeding, and planting.

Should additional site-specific environmental analyses at the time of exploration or development reveal the need for additional restrictions or the continuance of existing lease stipulations, these restrictions will become part of the development or operational plan.

Survey Monuments: All survey monuments, witness corners, reference monuments, and bearing trees shall be protected against destruction, obliteration, or damage. Any markers so affected must be re-established at the lessee's expense in accordance with the accepted BLM survey practices defined in the "Manual of surveying instructions for the Survey of the Public Lands of the United States."

J. MISCELLANEOUS

Upon determination by the Authorized Officer of an impending field development, a transportation plan will be required to reduce unnecessary access roads.

Additional site surveys, grading plans, and engineering designs may be required in VRM Class II areas.

Should additional site-specific environmental analyses at the time of exploration or development reveal the need for additional restrictions or the continuance of existing lease stipulations, these restrictions will become part of the development or operational plan.

Survey Monuments: All survey monuments, witness corners, reference monuments, and bearing trees shall be protected against destruction, obliteration, or damage. Any markers so affected must be re-established at the lessee's expense in accordance with accepted BLM survey practices defined in the "Manual of Surveying Instructions for the Survey of the Public Lands of the United States."

Burning of solid or liquid wastes usually requires a burning permit. The permit must be obtained from the state air quality agency.



APPENDIX E

**PROPOSED ACTION
ALTERNATIVE**

LEASE STIPULATIONS



APPENDIX E

PROPOSED ACTION ALTERNATIVE LEASE STIPULATIONS

INTRODUCTION

Oil and gas leases are issued granting the lessee the right to extract the oil and gas resource. Section 6 (see Appendix C) of the lease restricts the lease rights granted by requiring protection of other resources during development of the oil and gas. If it is necessary to restrict the rights more than in the standard lease contract, stipulations are appended to the lease. The additional restrictions needed to protect resources and values under this alternative are shown below, categorized by type of stipulation and Resource/Planning Area (GSRA, KRA, LSRA, NPA, and SJ/SMPA) to which they are applicable.

Stipulations are applied by legal description to oil and gas leases on the basis of standard quarter-quarter sections (40 acres) or lots. That is, any lease parcel containing at least a quarter-quarter section or lot needing mitigation will have the appropriate stipulation appended to the lease document. If the parcel of land needing mitigation is smaller than a quarter-quarter section or lot, no leasing stipulation is appended to the document since that small a parcel can be avoided by standard lease terms further defined in Code of Federal Regulations, Title 43, subpart 3101.1-2 (see discussion in Appendix C, page C-1). This means that sites requiring special protection, such as a one-acre site, do not require leasing stipulations. If, however, the same one-acre site must have protection for a quarter mile radius around the site, a leasing situation providing that protection would be written for the entire surrounding forty acre square (e.g., 1/4 1/4 section).

These stipulations are evaluated for use on all federal mineral estate regardless of surface ownership, with the exception of the federal

mineral estate underlying surface administered by the U. S. Forest Service.

The regulations covering modification and waiver of stipulations are found in the Code of Federal Regulations (CFR), Title 43, Subpart 3101.1-4. Generally, a waiver, exception, or modification may be approved if the record shows that circumstances or relative resource values have changed or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts, and that less restrictive stipulations will protect the public interest. Waivers, exceptions, or modifications can only be granted by the Authorized Officer. If the proposed waiver, exception, or modification is inconsistent with the plan, the plan will be amended or the change to the stipulation will be disallowed. Even where no exception criterion is identified, exceptions are considered on a case-by-case basis. The Glossary in Chapter 7 contains the definitions used by the BLM for waiver, exception, and modification.

Exceptions to leasing stipulations will be granted by the Authorized Officer if the reason for the exception is consistent with that analysis. No public notice is required for exceptions to lease stipulations which conform to the plan. Other possible exceptions may be granted only upon plan amendment and public notification.

Modifications to stipulations are made if and when resource management determines the stipulation is no longer effective as written. This situation occurs when new information (for example, from a monitoring program, technical data, etc.) shows that the protective measure is unnecessarily restrictive. Modification of a stipulation requires the preparation of an environmental assessment to determine the potential impacts and plan

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amendment or maintenance needs. If the modification is determined by the Authorized Officer to be substantial, a 30-day public notice will be given prior to modifying the lease stipulation.

Waiver means the complete elimination of a stipulation from a particular lease contract. A stipulation is waived by the Authorized Officer after preparation of an environmental assessment and a decision is made that the stipulation in question is no longer required for a particular lease. The decision to waive a substantial stipulation requires a plan amendment and a 30-day public notice period prior to waiver.

The stipulations common to two or more Resource/Planning Areas are listed first and the areas to which they apply are coded in a [] following the stipulation.

I. No Surface Occupancy Stipulations (NSO)

Serial No. _____
NO SURFACE OCCUPANCY STIPULATION
No Surface Occupancy or use is allowed on the lands described below (legal subdivision or other description).
For the purpose of:
Any change to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance of the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820)
Form #/Date
Figure E-1 Uniform Oil and Gas Lease Stipulation Format

The No Surface Occupancy stipulation is intended for use only when other stipulations are determined insufficient to adequately protect the public interest. The plan amendment analysis shows that less

restrictive stipulations are inadequate to protect the resource in question. These resources/values to be protected are also considered for no leasing areas, but it is determined that No Surface Occupancy is adequate for resource/value protection. An NSO stipulation is not needed if the desired protection does not require relocation of proposed operations by more than 200 meters (43 CFR 3101.1-2).

The Uniform Oil and Gas Lease Stipulation Format, shown in Figure E-1, will be used to append all new NSO stipulations to the lease document.

1. **Within area of approved surface coal mine:** Conservation of natural resources. This stipulation may be waived without a plan amendment if the lessee agrees that any well approved for drilling will be plugged below the coal when the crest of the highwall approaches within 500 feet of the well, and that the well will be re-entered or redrilled after the completion of mining operations through the well location. A suspension of operations and production will be considered for the lease only when a well is drilled and then is plugged, and a new well or re-entry is planned when the mine moves through the location.

2. **Grouse** (includes sage grouse, mountain sharp-tailed, lesser and greater prairie chickens). NSO within one-quarter mile radius of a lek site (courtship area). [All]

Exception for grouse leks. The NSO area may be altered depending upon the active status of the lek or the geographical relationship of topographical barriers and vegetation screening to the lek site.

3. **Raptors** (includes golden eagle and osprey; all accipiters; falcons except kestrel; butteos; and owls). Raptors that are listed and protected by the Endangered Species Act are addressed separately. NSO within one-eighth mile radius of nest site. [All]

Exception for raptor nest site. The NSO area may be altered depending on the active status of the nest site or the geographical relationship of topographic barriers and vegetation screening to the nest site.

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4. Bald Eagle NSO within one-quarter mile radius of the roost or nest site. [All]

Exception for bald eagle roost site. The NSO applies to the essential features of the winter roost site complex. The NSO area may be altered depending on the active status of the roost or the geographical relationship of topographic barriers and vegetation screening.

There are no exceptions for nest sites.

5. Peregrine Falcon NSO within one-quarter mile radius of cliff nesting complex. [All]

There are no exceptions for cliff nesting complexes.

6. Mexican Spotted Owl NSO within one-quarter mile radius of the confirmed roost site and nesting site. [All]

There are no exceptions for confirmed sites.

7. Waterfowl and Shorebird NSO on significant production areas (Major areas are Waterfowl Habitat Management Areas and rookeries.) [All]

No exceptions.

8. NSO on habitat areas with special status plant species (Includes federally listed and proposed species for listing and candidate species.) [All]

Exception for special status plant species habitat. The NSO may be altered after important factors are considered in the impact analysis such as the type and amount of surface disturbance; plant frequency and density; and the relocation of disturbances.

Glenwood Springs Resource Area --(NSO)

1. Major River Corridors: Protection of 1) threatened and endangered and sensitive fish and wildlife species, 2) riparian values, 3) waterfowl production areas, and 4) the lower Colorado River ACEC: One-half mile either side of the high water mark of the river. No exception criterion is identified.

2. Rifle Falls and Glenwood Springs Fish Hatcheries: Protection of water quality and quantity supplying the Rifle Falls and Glenwood Springs Fish Hatcheries: Two-mile radius of the hatcheries: Exception criterion would include special mitigative measures developed in consultation with Colorado Division of Wildlife.

3. Deep Creek ACEC/SRMA/VRM Class I/Cave Resource Area: Protection of recreational, visual, and cave resource values. No exception criterion identified. No Subsurface Occupancy: Drilling is prohibited through a zone beginning at the surface to an elevation of 5,600 feet above mean sea level. No exception criterion identified.

4. Bull Gulch ACEC/SRMA/VRM Class I: Protection of semi-primitive and non-motorized recreational values, and visual values: No exception criterion identified.

5. Thompson Creek ACEC/SRMA/VRM Class I: Protection of semi-primitive non-motorized recreational and visual values: No exception criterion is identified.

6. Hack Lake SRMA: Protection of semi-primitive non-motorized recreational and visual values: Exception criterion includes mitigative measures to screen operations from scenic view sheds; reduce to acceptable level drill rig and other equipment noise; and fence or otherwise protect recreating public from operations.

7. Rifle Mountain Park: Protection of recreational and visual values: Exception criterion includes mitigative measures to screen operations from scenic view sheds; reduce to acceptable level drill rig and other equipment noise; and fence or otherwise protect recreating public from operations. Exception mitigation will be developed in consultation with Park authorities.

8. Sunlight Peak Area: Protection of semi-primitive non-motorized recreational and visual values: Exception criterion includes mitigative measures to screen operations from scenic view sheds; make drill rig and other equipment noise substantially unnoticeable at a distance; and fence or make substantially unnoticeable at a distance or otherwise protect recreating public from operations.

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9. Garfield Creek, Basalt, and West Rifle Creek State Wildlife Areas: Protection of wildlife habitat values for which these areas were acquired: 1) Crucial big game and upland game winter habitat and concentration areas. 2) Riparian values. Exception criterion includes special mitigative measures approved by the Colorado Division of Wildlife.

10. Critical Watershed Areas: Protection of municipal watersheds providing domestic water for the communities of Rifle and New Castle and the for the protection of the Glenwood Springs Debris Flow Hazard Zone. No exception criterion is identified.

11. Colorado and Eagle Rivers SRMAs: NSO required to protect recreational and visual values: Exception criterion includes mitigative measures to screen operations from scenic view; make drill rig and other equipment noise substantially unnoticeable at a distance; and fence or otherwise protect recreation public from operations.

Kremmling Resource Area--(NSO)

1. Kremmling Cretaceous Ammonite ACEC/RNA: Protection of ammonite fossils: No exception criterion is identified.

2. North Park Phacelia ACEC/RNA: Protection of a known endangered plant species: No exception criterion is identified.

3. Windy Gap Cultural RMA: Protection of archaeological sites: No exception criterion is identified.

4. Colorado River SRMA: Protection of recreational and scenic values along part of the Colorado River: No exception criterion is identified.

5. North Sand Hills SRMA: Protection of recreational values: No exception criterion is identified.

6. Sulphur Ranger District Office: Protection of a U.S. Forest Service administrative site: No exception criterion is identified.

Little Snake Resource Area--(NSO)

1. Limestone Ridge ACEC: Protection of remnant plant associations and sensitive plant species, and scenic values: No exception criterion is identified.

2. Cross Mountain Canyon ACEC: Protection of sensitive plants, endangered species, scenic and recreational values: No exception criterion is identified.

3. Little Yampa/Juniper Canyon SRMA: Protection of flatwater boating opportunities and scenic values: No exception criterion is identified.

4. Cedar Mountain SRMA: Protection of recreational and educational opportunities, and scenic values: No exception criterion is identified.

5. Steamboat Lake State Park: Protection of recreational and scenic values: No exception criterion is identified.

6. Pearl Lake State Park: Protection of recreational and scenic values: No exception criterion is identified.

Northeast Planning Area--(NSO)

1. Reservoir and Railroad Right-of-Ways: Within certain reservoir and railroad rights-of-way to protect improvements. Exception criterion includes demonstrating to the satisfaction of the Authorized Officer that these lands can be occupied without damage to improvements.

2. Reservoirs and Rivers: Certain tracts that contain important riparian and wildlife values at or near the following: South Platte River; Prewitt Reservoir; Julesburg Reservoir; Prospect Reservoir; Horsecreek Reservoir; Milton Reservoir; Lower Latham Reservoir; Riverside Reservoir; Empire Reservoir; Bijou Reservoir; Ft. Collins Reservoir; South Republican River. Exception criterion includes demonstration to the Authorized Officer that operations can be conducted without causing unacceptable impacts to the values being protected.

3. State County and City Parks: Protection of recreational and scenic values: No exception criterion is identified.

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4. I-70 Corridor: Protection of scenic values along I-70 in Clear Creek County: Exception criterion includes mitigative measures to screen operations from scenic view sheds.

San Juan/San Miguel Planning Area--(NSO)

The following areas will have NSO stipulations appended to leases issued within them for the protection of scenic, natural, and cultural values and resources. No exception criterion is identified.

Cannonball Ruin

Lowry Ruin and Associations

Dominguez-Escalante Ruins

Tabeguache Cave II and Tabeguache Canyon

Dolores Cave

Tabeguache Pueblo

McLean Basin Towers and associations

Painted Hand Petroglyphs and associations

Painted Hand Ruin

Indian Henry's Cabin and associations

Lighting Tree Tower Group

Battle Rock

Easter Ruin

Seven Towers Ruin Group

Hovenweep Canyon

East Cortez

Goodman Canyon and Goodman Point Buffer Zone

Bass Ruin Complex

Sandstone Canyon

Brewer Well Complex

Yellowjacket Canyon

Basin Wickiup Village

Woods Canyon

Bridge Canyon

Porter Ruin

Upper Ruin Canyon

Bowdish Canyon

Sand and East Rock Canyons: Protection of archaeological values.

Squaw/Papoose, Cross, and Cahone Canyons: Protection of archaeological values.

Hovenweep National Monument Cooperative Management Strategies Area: Protection of the archaeological resources of Horseshoe/Holly House segment of the Hovenweep National Monument. No exception criterion identified.

Cutthroat Castle Ruin Group Buffer Zone: Protection of archaeological values.

Dolores River Canyon: Protection of recreational and visual values.

Bridge Canyon (McElmo) RNA: Protection of habitat for rare species of flora and fauna.

Menefee and Weber Mountains: Protection of recreational and visual values.

Horse Range Mesa Paleontological site (40 acres): Protection of vertebrate fossils: Exception criterion includes funding of accredited paleontological excavation to recover all vertebrate fossils to the point of scientific insignificance.

II. Timing Limitation Stipulations (TL)

The Timing Limitation (often called seasonal) stipulation prohibits fluid mineral exploration and development activities for time periods less than year-long. The dates and location(s) limiting activity are as specific as possible. A timing limitation stipulation is not necessary if the time limitation involves

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the prohibition of new surface disturbing operations for periods of less than 60 days (43 CFR 3101.1-2).

Timing limitations shorter than 60 days do not require a lease stipulation. The restriction is added directly to the field operation approval as a Condition of Approval (see Appendices D and F), and may be noted on the lease as Lease Notices (see Appendix E). However, in those cases where two or more time restrictions combine or overlap to form a restriction of more than 60 days, the closure will be attached to the lease as a stipulation, as a matter of Colorado BLM policy. Additional restrictions of 60 days or less may still be added to field operations for protection of resources/values other than those stipulated.

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TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

On the lands described below:

For the purpose of (reasons):

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

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Figure E-2.
Uniform Oil and Gas Stipulation Format

1. Big game species (includes species of mule deer, elk, pronghorn antelope, and bighorn sheep). Note: Crucial winter habitat includes severe big game winter range or other definable winter ranges as mapped by the Colorado Division of Wildlife.

Big Game Crucial Winter Habitat -
December 1 to April 30 [All]

Exception for big game crucial winter habitat. Under mild winter conditions, the last 60 days of the seasonal limitation period may be suspended. Severity of the winter will be determined on the basis of snow depth, snow crusting, daily mean temperatures, and whether animals were concentrated on the crucial winter range during the winter months.

Exception for big game crucial winter habitat. This limitation may or may not apply to work requiring a Sundry Notice pending environmental analysis of any operational or production aspects.

2. Big Game Birthing Areas: (by species)
Elk calving - April 16 to June 30
Pronghorn Antelope fawning -
May 1 to July 15
Rocky Mountain Bighorn Sheep
Lambing - May 1 to July 15
Desert Bighorn Sheep Lambing -
March 16 to May 30 [All]

Exception for Big Game Birthing Areas. When it is determined through a site-specific environmental analysis that specific actions would not interfere with critical habitat function or compromise animal condition within the project vicinity, the restriction may be altered or removed.

3. Grouse (includes sage grouse, mountain sharp-tailed, and lesser and greater prairie chickens)

Sage grouse crucial winter habitat -
December 16 to March 15 [All]

There are no exceptions.

4. Greater Sandhill Crane

Nesting and staging habitat areas - March 1 to October 16 [All]

There are no exceptions.

5. White Pelican

Nesting and feeding habitat areas - March 16 to September 30 [All]

There are no exceptions.

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6. Raptors (includes the golden eagle and osprey, and all accipiters; falcons, except the kestrel*; all butteos; and owls). Raptors that are listed and protected by the Endangered Species Act are addressed separately.

* Kestrels are very adaptable to nest in a variety of habitats and their populations are stable and widespread.

Raptor nesting and fledgling habitat - February 1 to August 15 [All]

This seasonal limitation applies to a one-quarter mile buffer zone around the nest site except for the ferruginous hawk and osprey.

Ferruginous hawk nesting and fledgling habitat - February 1 to August 15. The sensitivity of the ferruginous hawk to human associated disturbance activities requires a one-mile buffer zone to avoid nest abandonment.

Osprey nesting and fledgling habitat - April 1 to August 31. The sensitivity of osprey to human associated disturbance activities requires a half-mile buffer zone to avoid nest abandonment.

Exception for raptor nesting habitat. During years when a nest site is unoccupied or unoccupied by or after May 15, the seasonal limitation may be suspended. It may also be suspended once the young have fledged and dispersed from the nest.

7. Mexican Spotted Owl

Mexican spotted owl nesting and fledgling habitat - February 1 to July 31. [All]

The Mexican spotted owl has been petitioned for listing as a threatened or endangered species to U.S. Fish and Wildlife Service. Subject to the petition determination, the following habitat management guidelines and restrictions will be used to protect the Mexican spotted owl. These guidelines are adopted from the interim timber harvest management guidelines issued by the Forest Service, Southwest Region (*Federal Register*, Vol. 54, No.124, June 29, 1989).

Proposed restriction for Mexican spotted owl habitat. Core habitat areas are nesting, feeding, and roosting areas and are not considered to be overlapping. The Mexican

spotted owl territory is estimated at 2,000 acres. In core areas, 450 acres, with multiple sightings of the Mexican spotted owl but with no confirmed nest or roost sites, surface disturbance activities are restricted within the 450 acres of the total territory (2,000 acres). On the remaining acreage within the Mexican spotted owl territory, other surface activities are allowed pending impact assessments through the environmental analysis process.

In areas with a confirmed nest and roost site, surface management activities will be limited and will be determined on a case-by-case basis to allow as much flexibility as possible outside of the core area. The core area with a confirmed nest and roost site is 1,480 acres with restricted surface disturbance activities.

There are no exceptions.

8. Bald Eagle

Nesting Habitat - December 15 to June 15 [All]

Restriction for bald eagle courtship behavior and nesting habitat. This time period is extremely sensitive to human disturbance activities and may cause nest abandonment and desertion of long established territories. A one-half mile buffer zone around the nest site is required to prevent disruption of nesting.

Exception for bald eagle nesting habitat. During years when a nest site is unoccupied by or after May 15, the timing limitation may be suspended. It may also be suspended once the young have fledged and dispersed from the nest.

Winter Roost Site - November 16 to April 15

Restriction for bald eagle winter roost site. The sensitivity of bald eagles to human disturbance activities requires a one-half mile buffer area around the roost site to avoid relocation to less suitable areas.

Exception for winter roost habitat. If there is partial or complete visual screening of the area of activity, the primary zone around the roost site may be reduced to one-quarter mile.

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9. Peregrine Falcon

Cliff Nesting Complex - March 16 to July 31
[All]

Restriction for peregrine falcon cliff nesting complex. The sensitivity of peregrine falcon to human disturbance activities requires a half-mile buffer area around the nesting complex to prevent abandonment and desertion of established territories.

The following exception would apply only after formal Section 7 Consultation with the U.S. Fish and Wildlife Service was consummated.

Exception for nesting habitat. During years when a nest site is unoccupied or unoccupied by or after May 15, the seasonal limitation may be suspended. It may also be suspended once the young have fledged and dispersed from the nest.

Glenwood Springs Resource Area --(TL)

No additional.

Kremmling Resource Area--(TL)

No additional.

Little Snake Resource Area--(TL)

1. Isolated and/or Roadless Areas:
August 16 to November 14.

2. No helicopter or motor vehicle use would be allowed in the Wild Horse Herd Management Area (March 2 to June 30)--foaling season for wild horses.

3. No drilling or development operations activity would be permitted within a one-mile radius of the location listed below, from March 1 to December 1:

- Wild Horse Spring; NE1/4SE1/4 sec. 26, T. 10 N., R. 98 W.
- Shepherd Spring; SE1/4SE1/4 sec. 8, T. 10 N., R. 98 W.
- Coffee Pot Spring; SE1/4NW1/4 sec. 22, T. 11 N., R. 98 W.
- Two Bar Spring; SE1/4SW1/4 sec. 35, T. 9 N., R. 99 W.
- Dugout Draw Spring; SW1/4SE1/4 sec. 33, T. 10 N., R. 97 W.

This restriction would allow wild horses the uninhibited and undisturbed use of their critical drinking water sources during the period when snow is generally unavailable. Exception criterion would include provision, by the operator, of an alternate dependable water source at a suitable location outside the mile radius of the spring prior to the authorized activity. The alternate source shall be installed and properly functioning in a continuous manner for a sufficient time, prior to activity, to allow the wild horses to locate and use the source. No activity will be allowed to commence until this stipulation is completely and satisfactorily complied with. Maintenance would be the sole responsibility of the operator.

Northeast Planning Area--(TL)

1. North Sterling Reservoir on Developed Recreation Lands: Protection of scenic and recreational values: May 15 - September 15. An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that operations can be conducted without causing unacceptable impacts to the scenic and recreational values.

2. Cherokee Park State Wildlife Area (Middle, Lower, and Lone Pine Units): Protection of wildlife and recreational values: May 1 - September 30. An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that operations can be conducted without causing unacceptable impact to the wildlife and recreational values.

San Juan/San Miguel Planning Area--(TL)

1. Wild Horse Foaling Area: March 2 to June 30

III. Controlled Surface Use Stipulations (CSU)

The Controlled Surface Use (CSU) Stipulation is intended to be used when fluid mineral occupancy and use are generally allowed on all or portions of the lease area year-round, but because of special values or resource concerns, some aspects of lease activities must be strictly controlled. The CSU stipulation is used to identify

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constraints on surface use or operations which may otherwise exceed the mitigation available under Section 6 of the standard lease terms, regulations, and operating orders. The CSU stipulation is less restrictive than the NSO or TL stipulations, which prohibit all occupancy and use on all or portions of a lease for all or portions of a year. The use of this stipulation should be limited to areas where restrictions or controls are necessary for specific types of activities rather than all activity.

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CONTROLLED SURFACE USE STIPULATION

Surface occupancy or use is subject to the following special constraints.

On the lands described below:

For the purpose of:

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

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Figure E-3
Uniform Oil and Gas Stipulation Format

1. For the conservation of natural resources, operations proposed within the area of an approved underground coal mine will be relocated outside the area to be mined or to accommodate room and pillar mining operations. This stipulation may be waived without a plan amendment if the lessee agrees that the drilling of a well will be subject to the following conditions: (1)(a) well must be plugged when the mine approaches within 500 feet of the well; (b) well must be plugged in accordance with Mine Safety and Health Administration (formerly Mine Enforcement and Safety Administration) Informational Report 1052; (c) operator will provide accurate location of where the casing intercepts the coal by providing a directional

and deviation survey of the well to the coal operator; or (2) relocate well into a permanent pillar or outside the area to be mined. A suspension of operations and production will be considered when the well is plugged and a new well is to be drilled after mining operations move through the location. [All]

2. Fragile Soil Areas. Prior to surface disturbance of fragile soils, it must be demonstrated to the Authorized Officer through a plan of development that the following performance objectives will be met. [GSRA, LSRA]

Performance Objectives:

I. Maintain the soil productivity of the site.

II. Protect off-site areas by preventing accelerated soil erosion (such as landsliding, gullyng, rilling, piping, etc.) from occurring.

III. Protect water quality and quantity of adjacent surface and groundwater sources.

IV. Select the best possible site for development in order to prevent impacts to the soil and water resources.

Fragile soil areas, in which the performance objective will be enforced, are defined as follows:

a. Areas rated as highly or severely erodible by wind or water, as described by the Soil Conservation Service in the Area Soil Survey Report or as described by on-site inspection.

b. Areas with slopes greater than or equal to 35 percent, if they also have one of the following soil characteristics: (1) a surface texture that is sand, loamy sand, very fine sandy loam, fine sandy loam, silty clay or clay; (2) a depth to bedrock that is less than 20 inches; (3) an erosion condition that is rated as poor; or (4) a K factor of greater than 0.32.

Performance Standards:

I. All sediments generated from the surface-disturbing activity will be retained on site.

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II. Vehicle use would be limited to existing roads and trails.

III. All new permanent roads would be built to meet primary road standards (BLM standards) and their location approved by the Authorized Officer. For oil and gas purposes, permanent roads are those used for production.

IV. All geophysical and geochemical exploration would be conducted by helicopter, horseback, on foot, or from existing roads.

V. Any sediment control structures, reserve pits, or disposal pits would be designed to contain a 100-year, 6-hour storm event. Storage volumes within these structures would have a design life of 25 years.

VI. Before reserve pits and production pits would be reclaimed, all residue would be removed and trucked off-site to an approved disposal site.

VII. Reclamation of disturbed surfaces would be initiated before November 1 each year.

VIII. All reclamation plans would be approved by the Authorized Officer in advance and might require an increase in the bond.

3. Prior to surface disturbance on slopes of, or greater than, 40 percent, an engineering/reclamation plan must be approved by the Authorized Officer. Such plans must demonstrate how the following will be accomplished: [All]

- a. Site productivity will be restored.
- b. Surface runoff will be adequately controlled.
- c. Off-site areas will be protected from accelerated erosion such as drilling, gullying, piping, and mass wasting.
- d. Surface-disturbing activities will not be conducted during extended wet periods.
- e. Construction will not be allowed when soils are frozen.

Exception Criteria: None.

4. For the protection of perennial water impoundments and streams, and/or riparian/wetland vegetation zones, activities associated with oil and gas exploration and development including roads, transmission lines, storage facilities, are restricted to an area beyond the riparian vegetation zone. [All]

Exceptions: This stipulation may be excepted subject to an on-site impact analysis with consideration given to degree of slope, soils, importance to the amount and type of wildlife and fish use, water quality, and other related resource values.

This stipulation will not be applied where the Authorized Officer determines that relocation up to 200 meters can be applied to protect the riparian system during well siting.

Glenwood Springs Resource Area --(CSU)

1. Visual Resource Management Class II Areas: Relocation of operations more than 200 meters as required to protect visual values: Exception criteria include mitigative measures to screen operations from scenic view sheds and restoration of disturbed areas to a condition substantially unnoticeable to casual observer.

Kremmling Resource Area--(CSU)

No additional.

Little Snake Resource Area-- (CSU)

1. Irish Canyon ACEC. Inventory for sensitive plant and remnant vegetation associations will be required. Sensitive plants and associations identified will be avoided. Known geologic values and cultural resources will be avoided.

2. Lookout Mountain ACEC. Inventory for sensitive plant and remnant vegetation associations will be required. Sensitive plants and associations identified will be avoided.

Northeast Planning Area--(CSU)

No additional.

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San Juan/San Miguel Planning Area--(CSU)

No additional.

IV. Special Administrative Stipulations (SA)

These are stipulations provided by another agency or organization. The BLM encourages other agencies to use the Rocky Mountain Regional Coordinating Committee's Uniform Stipulation Format, however, that is not always feasible.

Glenwood Springs Resource Area --(SA)

None

Kremmling Resource Area--(SA)

None

Little Snake Resource Area--(SA)

None

Northeast Planning Area--(SA)

1. Bureau of Reclamation Lands will be subject to Special Stipulations developed by that agency. The "Special Stipulation" currently in use by the Bureau of Reclamation is available for review in the Northeast Resource Area Office.

2. The Lowry Bombing Range (3,657 acres) lands will be subject to Special Stipulations developed by the U. S. Air Force. The Special Stipulations currently in use by the U. S. Air Force concerning unexploded ordnance is available for review in the Northeast Resource Area Office.

San Juan/San Miguel Planning Area--(SA)

None

V. Lease Notices (LN)

Lease Notices are attached to leases to transmit information at the time of lease issuance to assist the lessee in submitting acceptable plans of operation, or to assist in administration of leases. Lease Notices are

attached to leases in the same manner as stipulations, however, there is an important distinction between Lease Notices and stipulations. Lease Notices do not involve new restrictions or requirements. Any requirements contained in a Lease Notice must be fully supported in either a law, regulations, standard lease terms, or onshore oil and gas orders. Guidance in the use of Lease Notices is found in BLM Manual 3101 and CFR 3101.1-3.

If a situation or condition is known to exist that could affect lease operations, there should be full disclosure at the time of lease issuance via a Lease Notice. If a lessee may be prevented from extracting oil and gas through a prohibition mandated by a specific nondiscretionary statute, such as the Endangered Species Act, a stipulation may be used even though a Lease Notice would be sufficient. It is at the discretion of the Authorized Officer whether a situation is sufficiently sensitive to warrant the use of a lease stipulation.

Lease Notices common to two or more Resource/Planning Areas-- applicable areas are shown in a [] following the Notice.

1. Surface-disturbing activities in Class I and II Paleontological Areas will have an inventory performed by an accredited paleontologist approved by the Authorized Officer. [All]

2. In order to protect nesting sage grouse, surface disturbing activities proposed during the period between March 1 and June 30 will be relocated, consistent with lease rights granted and section 6 of the standard lease terms, out of sage grouse nesting habitat. Sage grouse nesting habitat is described as sagebrush stands with sagebrush plants between 30 and 100 centimeters in height and a mean canopy cover between 15 percent and 40 percent. [All]

3. Sensitive Species Areas: In areas of known or suspected habitat of sensitive plant or animal species, and high priority remnant vegetation associations, a biological and/or botanical inventory may be required prior to approval of operations. The inventory would be used to prepare mitigative measures (consistent with lease rights granted) to reduce the impacts of surface disturbance to

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the sensitive plant or animal species. These mitigative measures may include (but, are not limited to) relocation of roads, pads, pipelines, and other facilities, and fencing operations or habitat. [GSRA, LSRA]

Glenwood Springs Resource Area --(LN)

1. Blue Hill Archaeological ACEC: This area contains a high density of prehistoric and cultural resources. Mitigation will be required at the operator's expense upon discovery of any resources at the time of development. Mitigation would require the services of an archaeologist (private contractor) approved by the Authorized Officer to conduct extensive field work, such as excavation and monitoring of construction activities.

Kremmling Resource Area--(LN)

No additional.

Little Snake Resource Area--(LN)

1. Exploration (including seismic exploration, drilling, or other development or production activity) will generally not be allowed on sheep lambing grounds during lambing activity. Lambing activities usually fall between April 10 and June 30 and last for approximately six weeks. Dates for the six-week closure will be determined for each operation as local conditions dictate.

2. Prairie dog complexes are being evaluated to determine their habitat suitability for potential reintroduction of the federally endangered black-footed ferret. No surface disturbance activities will be allowed that may significantly alter the prairie dog complex making it unsuitable for reintroduction of the black-footed ferret. Search guidelines developed by the U. S. Fish and Wildlife Service to determine the presence of the black-footed ferret will continue to be required under Section 7 Consultation requirements.

In areas where recovery actions for the black-footed ferret are likely to occur, the following guidelines will be used to assist in coordinating recovery efforts where petroleum development is proposed or currently exist. These guidelines were developed by the U.S. Fish and Wildlife

Service, Denver Regional Office, Colorado as a draft document titled *Guidelines for Oil and Gas Activities in Prairie Dog Ecosystems Managed for Black-footed Ferret Recovery*, February 1990.

a. Petroleum operations and servicing personnel should receive information and instructions about black-footed ferret natural history and it's recovery program to encourage an understanding of the significance of the recovery effort to the species' survival and recovery.

b. New power lines through the recovery management area should be buried or designed to preclude use as hunting perches by raptorial species such as great horned owls, ferruginous hawks, and golden eagles. Buried power lines should be planned like pipelines as confined to corridors in ecologically less desirable areas outside of prairie dog colonies.

c. Petroleum development in or near prairie dog colonies occupied by ferrets through recovery efforts should avoid, whenever possible, the period between March 1 to August 31 to avoid impacts to ferrets during breeding, gestation, and weaning periods.

d. Management agencies, landowners, petroleum companies, and other involved agencies should be included early in general field evaluations and planning activities for petroleum developments. This cooperative effort will result in the development and approval of a Surface Use Plan of Operation that will identify the necessary permits, schedule, and activities commencing development operations.

e. Proposed developments should be designed to avoid any unpermitted taking of black-footed ferrets. In any case where harm or taking of ferrets is deemed possible by the U.S. Fish and Wildlife Service or the Colorado Division of Wildlife, a permit is required to be issued by these agencies.

f. Whenever proposed petroleum developments cannot be designed to avoid adverse impacts to black-footed ferret or their habitat (components of the prairie dog ecosystem important to ferrets), a compensation plan should be cooperatively developed and agreed to by the petroleum

PROPOSED ACTION ALTERNATIVE LEASE STIPULATIONS

company proposing the development and the land management agency and other cooperating agencies and affected landowners.

Northeast Planning Area--(LN)

1. Air Force Cable Notice: Proposed operations located near Air Force underground cables will be moved so as to not interfere with cable performance.

San Juan/San Miguel Planning Area--(LN)

No additional.

5. Peterson Air Force Base (1,000 acres)
6. Rocky Mountain Arsenal (17,707 acres)
7. Rocky Mountain National Park (120 acres)
8. Lowry Air Force Base (1,920 acres)
9. Buckley Air National Guard (3,200)

San Juan/San Miguel Planning Area--(NL)

None

VI. No Lease Areas (NL)

The 1920 Mineral Leasing Act subjects all federally owned mineral estate to oil and gas leasing, with certain exceptions (see 43 CFR 3100.0-3). Exceptions include units of the National Park System; incorporated towns, cities and villages; wilderness study areas; wilderness areas; and others. BLM may make discretionary closures to leasing if resource/values are of sufficient importance and there is no way to mitigate impacts through a less stringent stipulation.

This section lists those discretionary closures within the planning units.

Glenwood Springs Resource Area --(NL)

None

Kremmling Resource Area--(NL)

1. Split estate inside Troublesome WSA (625 acres)

Little Snake Resource Area--(NL)

None

Northeast Planning Area--(NL)

1. Air Force Academy (17,900 acres)
2. Bennett Army National Guard (242 acres)
3. Fitzsimmons Army Medical Center (600 acres)
4. Fort Carson (82,700 acres)



APPENDIX F

**PROPOSED ACTION
ALTERNATIVE**

**CONDITIONS OF
APPROVAL**



APPENDIX F

PROPOSED ACTION ALTERNATIVE CONDITIONS OF APPROVAL

The conditions of approval (COAs) shown in Appendix D will be used to protect resources analyzed within this Alternative. In addition to the COAs common to all alternatives, the following COAs will be appended to approval documents, as needed.

THE FOLLOWING COAS ARE COMMON TO TWO OR MORE RESOURCE/PLANNING AREAS --APPLICABLE AREAS ARE SHOWN IN A [] .

Class I and II Paleontological Areas will have an inventory performed by an accredited paleontologist approved by the Authorized Officer. [All]

In order to protect nesting sage grouse, surface disturbing activities proposed during the period between March 1 and June 30 will be relocated, consistent with lease rights granted and section 6 of the standard lease terms, out of sage grouse nesting habitat. Where relocation up to 200 meters will not remove the proposed operation out of identified habitat (generally where the habitat stand is in a block larger than 40 acres), proposed activities during this time period will be relocated to minimize disturbance to nesting grouse. Sage grouse nesting habitat is described as sagebrush stands with sagebrush plants between 30 and 100 centimeters in height and a mean canopy cover between 15 percent and 40 percent. [All]

Prairie dog complexes are being assessed to determine their suitability for reintroduction of the federally endangered black-footed ferret. An inventory will be conducted prior to starting operations. [GSRA, LSRA, NPA, SJ/SMPA]

Sensitive Species Areas: A biological and/or botanical inventory may be required prior to starting operations. [GSRA, LSRA]

Wells approved in an area of an approved surface coal mine plan must be plugged below the coal when the crest of the highwall approaches within 500 feet of the well. The well can be redrilled or re-entered at a later date. A suspension of operations and production would be considered when the well is plugged and a new well or re-entry is planned when the mine moves through the location. [All]

The following conditions apply to wells approved in areas of an approved underground coal mine plan: (1) (a) well must be plugged when mining approaches within 500 feet of the well; (b) well must be plugged in accordance with Mine Safety and Health Administration (formerly Mine Enforcement and Safety Administration) Informational Report 1052; (c) operator will provide accurate location of where the casing intercepts the coal by providing a directional and deviation survey of the well to the coal operator; or (2) relocate well into a permanent pillar or outside area to be mined. A suspension of operations and production will be considered when the well is plugged and a new well is to be drilled after mining operations move through the location. [All]

The following conditions apply to wells approved in areas outside of approved underground coal mines and where coal is leased: (1)(a) well must be plugged when mining approaches within 500 feet of the well; (b) well must be plugged in accordance with Mine Safety and Health Administration (formerly Mine Enforcement and Safety Administration) Informational Report 1052; (c) operator will provide accurate location of where the casing intercepts the coal by providing a directional and deviation survey of the well to the coal operator. A suspension of operations and production will be considered when the well is plugged and a new well is to be drilled after mining operations move through the location. [All]

APPENDIX F

GLENWOOD SPRINGS RESOURCE AREA

Blue Hill Archaeological ACEC: This area contains a high density of prehistoric and cultural resources. Mitigation will be required at the operator's expense upon discovery of any resources at the time of development. Mitigation would require the services of an archaeologist (private contractor) approved by the Authorized Officer to conduct extensive field work, such as excavation and monitoring of construction activities.

LITTLE SNAKE RESOURCE AREA

Lambing grounds: Exploration (including seismic exploration, drilling, or other development or production activity) will not be allowed on sheep lambing grounds during lambing activity. Lambing activities usually fall between April 10 and June 30 and last for approximately six weeks. Dates for the six week closure will be determined for each operation as local conditions dictate. An exception will be considered for this COA for drilling operations which would require more than nine months to complete and for which it was also shown to the satisfaction of the Authorized Officer that the drilling operations could not avoid taking place in lambing areas during lambing activities.

NORTHEAST PLANNING AREA

Operations located near Air Force underground cables will be moved so as not to interfere with cable performance.

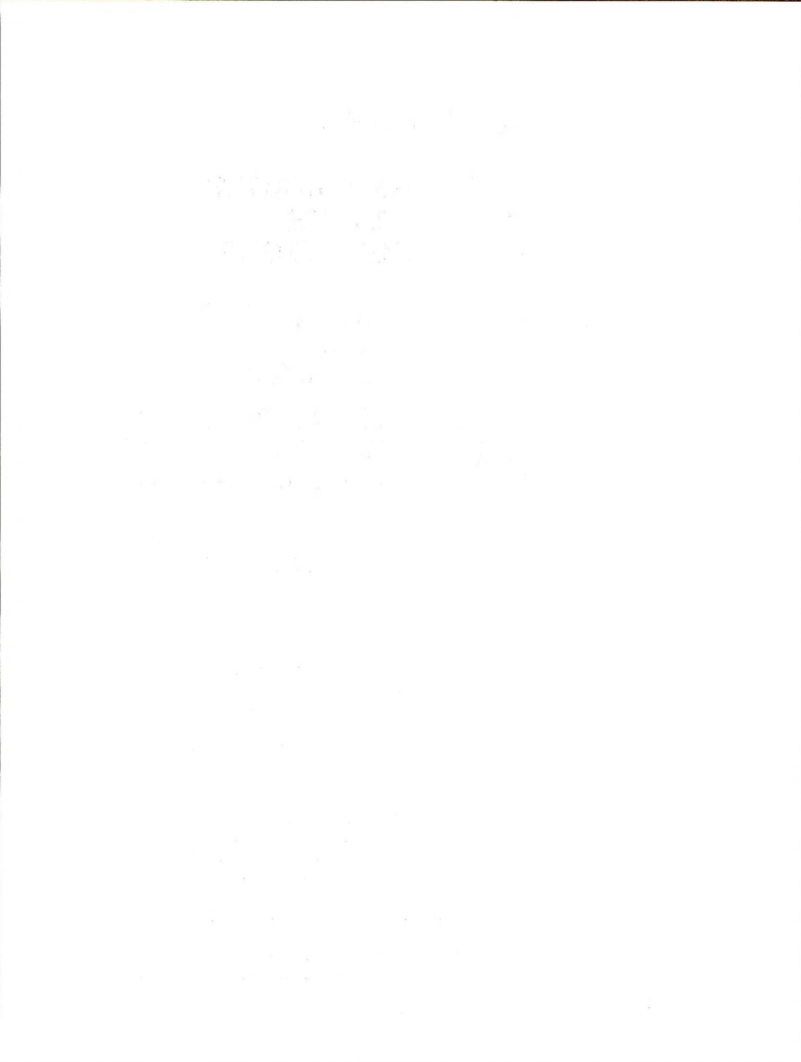
SAN JUAN/SAN MIGUEL PLANNING AREA

When wells are proposed/drilled proximal to the outcrop of the producing Fruitland coal bed, geochemical surveys (e.g., soil gas surveys, water analyses, etc.) will be required along the outcrop and vicinity, on a case-by-case basis, to detect/monitor any changes in gas content. An initial survey is required to determine "baseline" conditions and establish "background" levels of methane in the soils. Subsequent surveys will be required on a periodic basis to determine if gas concentrations are changing.

APPENDIX G

PRESENT MANAGEMENT ALTERNATIVE

LEASE STIPULATIONS



APPENDIX G

PRESENT MANAGEMENT ALTERNATIVE LEASE STIPULATIONS

Stipulations would be attached to oil and gas leases when they are issued for the Present Management (No Action) alternative.

GLENWOOD SPRINGS RESOURCE AREA

1. No Surface Occupancy stipulations would be attached to leases issued in the following areas: Thompson Creek Natural Environment Area; Fryingpan, Roaring Fork, Eagle, Crystal, and Colorado River Corridors; Rifle Mountain Park and Rifle Fish Hatchery; Hack Lake Recreation Management Area; Deep Creek ACEC; Municipal watersheds; Glenwood Springs Debris Flow Hazard Zone.
2. Wildlife seasonal stipulations would be attached to leases issued in the areas listed below, prohibiting oil and gas development during the time periods listed.

KREMMLING RESOURCE AREA

1. Wildlife seasonal stipulation would be attached to leases issued in the areas listed below, prohibiting oil and gas development during the time periods listed.
2. No Surface Occupancy stipulations would be attached to leases issued in the Kremmling Creataceous Ammonite Area of Critical Environmental Concern (ACEC).
3. No Surface Occupancy stipulations would be attached to leases issued on known

occurrences of Phacelia formosula and Osterhout's Milkvetch.

4. No Surface Occupancy stipulations would be attached to leases issued in the Windy Gap Cultural Resource Management Area.
5. No Surface Occupancy stipulations would be attached to leases issued in Colorado River and North Sand Hills Special Recreation Management Areas.
6. No Surface Occupancy stipulations would be attached to leases issued on sage grouse strutting grounds.
7. Notification is provided to oil and gas lessees on known recoverable coal areas that coal development may present conflicts with recovery of oil and gas resources.

Glenwood Springs Resource Area

Type of Area Restricted	Dates Activity Prohibited
Sage grouse strutting grounds	March 20 - May 20
Sage grouse winter concentration areas	November 15 - March 15
Raptor nesting areas	April 1 - August 31
Critical deer and elk winter range	January 15 - April 30
Elk calving area.	May 1 - July 1

Kremmling Resource Area

Type of Area Restricted	Dates Activity Prohibited
Greater sandhill crane nesting buffer zones	April 11 - July 1
Sage grouse strutting ground buffer zones	March 16 - June 14
Sage grouse critical winter range	December 17 - March 15
Critical raptor nest buffer zones	March 1 - August 27
Bald eagle wintering habitat	November 1 - March 15
Big-game critical winter range	December 16 - April 15
Elk calving	May 1 - June 15

APPENDIX G

LITTLE SNAKE RESOURCE AREA

1. Wildlife seasonal stipulation would be attached to leases issued in the areas listed below, prohibiting oil and gas development during the time periods listed.

2. No Surface Occupancy stipulations would be attached to leases issued in wildlife habitat for raptors, the greater sandhill crane, wildlife watering areas, beaver colonies, sage grouse strutting grounds, and potential black-footed ferret habitat (some prairie dog towns).

3. The following performance objectives would be attached to leases issued in areas of fragile soils.

I. Maintain the soil productivity of the site by reducing soil loss from erosion and through proper handling of the soil material.

II. Reduce impact to off-site areas by controlling erosion and/or overland flow from these areas.

III. Protect water quality and quantity of adjacent surface and groundwater sources.

IV. Reduce accelerated erosion caused by surface-disturbing activities.

V. Select the best possible site for development in order to reduce the impacts to the soil and water resources.

Fragile soil areas, in which the performance objective will be enforced, are defined as follows:

a. Areas rated as highly or severely erodible by wind or water, as described by the Soil

Conservation Service in the Area Soil Survey Report or as described by on-site inspection.

b. Areas with slopes greater than or equal to 35 percent, if they also have one of the following soil characteristics: 1) a surface texture that is sand, loamy sand, very fine sandy loam, fine sandy loam, silty clay, or clay; 2) a depth to bedrock that is less than 20 inches; 3) an erosion condition that is rated as poor; or 4) a K factor of greater than 0.32.

Narrative: All proposed surface-disturbing activities within fragile soil areas will undergo a site-specific review at the resource area and/or district level.

To achieve the performance objectives, BLM has identified the following performance standards/stipulations that may apply to surface-disturbing activities. Depending on these variables, an applicant must demonstrate that the performance objectives have been met either through a plan of development, using alternative measures, or through use of the mitigative measures identified below. If the performance objectives through application of the performance standards/stipulations cannot be met, surface occupancy will not be authorized.

1) All sediments generated from the surface-disturbing activity will have to be retained on-site.

2) Construction or other surface-disturbing activities will not be allowed when the soils are saturated to a depth of more than three inches.

3) Vehicle use will be limited to existing roads and trails.

4) All new permanent roads will be built to meet primary road standards (BLM standards); their location will be approved by the Authorized Officer. For oil and gas purposes, permanent roads are those used for production.

5) All geophysical and geochemical exploration will be conducted by helicopter, horseback, on foot, or from existing roads.

Little Snake Resource Area

Type of Area Restricted	Dates Activity Prohibited
Greater sandhill crane nesting and staging area buffer zones	March 1 - October 15
Sage grouse strutting ground buffer zone	March 1 - May 31
Critical raptor nest buffer zones	February 1 - July 31
Bald eagle habitat	November 1 - April 15
Sharptail grouse dance ground buffer zone	March 15 - June 15
Mule deer, bighorn sheep, pronghorn antelope, mountain lion, elk critical winter range	December 1 - April 15
Elk calving, pronghorn antelope fawning, bighorn sheep lambing	May 1 - June 30

PRESENT MANAGEMENT ALTERNATIVE LEASE STIPULATIONS

6) Any sediment-control structures, reserve pits, or disposal pits will be designed to contain a 100-year, 6-hour storm event. Storage volumes within these structures will have a design life of 25 years.

7) Before reserve pits, production pits, or emergency pits can be reclaimed, all residue will be removed and trucked off-site to an approved disposal site.

8) Reclamation of disturbed surfaces will be initiated before November 1 each year.

4. No Surface Occupancy stipulations would be attached to leases issued in Limestone Ridge ACEC and Cross Mountain Canyon ACEC.

5. An avoidance stipulation will be attached to that portion of any oil and gas lease issued within Irish Canyon ACEC, Lookout Mountain ACEC, Ace-in-the-Hole Area, Hells Canyon Area, G-Gap Area, Vermillion Creek Area, Vermillion Bluffs Area, and Horse Draw Area and any other area where sensitive plants are found.

The avoidance stipulation states:

On-the-ground surveys for Colorado BLM sensitive plant species will be required before any surface-disturbing activity takes place in areas of previously unsurveyed potential habitat.

The locations of all known populations of Colorado BLM sensitive plants and selected high priority remnant vegetation associations will be protected from human-induced surface disturbing activities.

The area of protection will include the actual location of the populations or occurrence and, if present, adjacent sites critical to their habitat. Selected occurrences of important vegetation associations to receive protection shall be determined in consultation and coordination with the Colorado Natural Areas Program (CNAP).

Those populations/occurrences, upon which analysis determines protection to be necessary, shall be protected by: 1) requiring relocation or rerouting of proposed well sites, pipelines, roads, other surface facilities, etc., or 2) applying other protective mitigation (i.e., fencing). BLM will effectively mitigate potential impacts to important populations/occurrences.

6. A No Surface Occupancy stipulation would be attached to that portion of any oil and gas lease within the Little Yampa/Juniper Canyon Special Recreation Management Area and the Cedar Mountain management unit.

7. A No Surface Occupancy stipulation would be attached to that portion of any oil and gas lease within Steamboat Lake State Park.

NORTHEAST PLANNING AREA

The table below summarizes the seasonal closure stipulations.

The appropriate stipulations would be attached where necessary when the lease is issued. The stipulations currently in use are listed below.

No Surface Occupancy Stipulation

1. No Surface Occupancy is allowed on the lands described below (legal subdivision or other description).

Within certain reservoir and railroad rights-of-way.

For the purpose of (reasons): Protecting structures within the rights-of-way, and because of the physical impossibility of occupying some of these lands.

Northeast Resource Area

Type of Area Restricted	Dates Activity Prohibited
Important waterfowl breeding & nesting habitat	April 1 - June 30
Greater prairie chicken courtship & nesting habitat	March 28 - July 15
Bald eagle winter habitat	November 15 - April 15
Raptor nesting habitat	February 15 - June 30
Crucial mule deer & elk winter range	December 15 - May 31
Elk & bighorn winter range & birthing areas	December 15 - June 30
Turkey	April 1 - July 31
Nesting & feeding habitat for white pelicans	March 15 - September 30

APPENDIX G

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that these lands can be occupied without damage to improvements.

This stipulation may be waived by the Authorized Officer if it is determined that the structures within the rights-of-way have been abandoned.

2. No Surface Occupancy is allowed on the lands described below (legal subdivision or other description).

Certain tracts that contain important riparian and wildlife values at or near:

South Platte River
Prewitt Reservoir
Julesburg Reservoir
Prospect Reservoir
Horsecreek Reservoir
Milton Reservoir
Lower Latham Reservoir
Riverside Reservoir
Empire Reservoir
Bijou Reservoir
Ft. Collins Reservoir
South Republican River

For the purpose of (reasons): Protecting important wildlife and riparian values associated with these areas.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that operations can be conducted without causing unacceptable impacts to the values being protected.

Timing Limitation Stipulation

No Surface Use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

1. May 15 to September 15

On developed recreation lands at North Sterling Reservoir.

For the purpose of (reasons): Protecting scenic and recreational values at North Sterling Reservoir.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that operations can be conducted without causing unacceptable impacts to the recreational values.

This stipulation may be waived by the Authorized Officer if North Sterling Reservoir is no longer used for recreational purposes.

2. March 31 to July 1

Buffer zones around important waterfowl breeding and nesting habitat.

For the purpose of (reasons): Protecting waterfowl from activities that would alter breeding behavior, increase the incidence of nest abandonment, and decrease nesting success.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that the waterfowl nesting area is not being utilized and is expected to remain so because of a temporary change in climate and/or habitat, or that impacts can be mitigated so as not to cause nest abandonment and decreased breeding success.

This stipulation may be waived by the Authorized Officer only upon a determination that waterfowl nesting areas do not exist within the lease.

3. March 28 to July 15

Buffer areas for greater prairie chicken courtship and nesting habitat.

For the purpose of (reasons): Protecting important habitat required by this species to maintain or increase its numbers in Colorado. The greater prairie chicken is a state endangered species.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that the courtship/nesting habitat is not being utilized and is expected to remain so because of a temporary change in climate and/or habitat.

This stipulation may be waived by the Authorized Officer only upon determination

PRESENT MANAGEMENT ALTERNATIVE LEASE STIPULATIONS

that courtship/nesting habitat does not exist within the lease.

4. November 15 to April 15

Buffer areas for bald eagle winter habitat including roost, perch, and hunting habitat.

For the purpose of (reasons): Protecting important bald eagle wintering habitat from disturbance which might cause the birds to abandon these areas for less suitable habitat.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that the winter habitat is not being used and is expected to remain so because of a temporary change in climate and/or habitat, or that impacts can be mitigated to avoid the abandonment of winter habitat.

5. February 15 to July 1

On the lands described below:

Buffer areas around known or suitable potential raptor nesting habitat.

For the purpose of (reasons): Protecting nesting habitat from disturbance which could cause raptors to abandon areas that contain suitable nesting habitat, possibly resulting in an overall reduction in numbers in the state.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that the nesting habitat is not being utilized and is expected to remain so, or that impacts can be mitigated to avoid the abandonment of occupied nesting habitat.

This stipulation may be waived by the Authorized Officer only upon the determination that potential nesting habitat does not exist within the lease.

6. December 15 to April 1

Crucial mule deer and elk winter range.

For the purpose of (reasons): Protecting crucial mule deer and elk winter range from activities that would cause these species to abandon areas of crucial winter cover and forage for less suitable areas.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that the crucial winter range is not being utilized and is expected to remain so because of a temporary change in climate and/or habitat, or that impacts can be mitigated to avoid the abandonment of crucial winter range and forage.

This stipulation may be waived by the Authorized Officer only upon the determination that crucial winter range does not exist within the lease.

7. December 15 to July 1

Crucial elk and bighorn sheep winter habitat and calving and lambing areas.

For the purpose of (reasons): Protecting crucial elk and bighorn sheep winter range, as well as calving and lambing areas, from activities that could cause these species to abandon these areas and be forced to use less suitable ranges.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that the crucial winter range, calving, or lambing areas are not being utilized and are expected to remain so because of a temporary change in climate and/or habitat, or that impacts can be mitigated to avoid the abandonment of these areas.

This stipulation may be waived by the Authorized Officer only upon the determination that crucial winter range, elk calving, or bighorn lambing areas do not exist within the lease.

8. March 15 to October 1

Important nesting, feeding, and resting areas for white pelicans.

For the purpose of (reasons): Protecting important nesting, feeding, and resting areas for white pelicans from activities that could cause the birds to abandon these areas for less suitable habitat.

An exception to this stipulation may be approved if it can be demonstrated to the satisfaction of the Authorized Officer that the habitat is not being utilized and is expected to

APPENDIX G

remain so because of a temporary change in climate and/or habitat, or that impacts can be mitigated to avoid the abandonment of these areas, and reduction of nesting success.

This stipulation may be waived by the Authorized Officer only upon the determination that important white pelican habitat does not exist within the lease.

In addition to the stipulations described above, certain lands will not be leased for oil and gas. These lands are those that are not within one-half mile of occupiable lands which are generally associated with large reservoirs, and within incorporated towns and cities.

On other lands that may or may not contain important surface use values, stipulations will be attached to the lease, or made part of the APD on a case-by-case basis. These are lands where the BLM does not have surface management authority. Generally, they are the lands associated with military bases and with certain state parks, and lands in the Front Range where oil and gas potential is considered very low.

SAN JUAN/SAN MIGUEL PLANNING AREA

1. Mule Deer and Elk Crucial Winter Ranges

To protect important seasonal wildlife habitat, exploration, drilling, and other developmental activity will be prohibited from December 1 to April 15 on crucial mule deer and elk winter ranges. This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by BLM's Authorized Officer.

2. Sage Grouse Strutting Grounds

To protect important seasonal wildlife habitat, exploration, drilling, and other developmental activity will be prohibited from March 15 to May 15 on sage grouse strutting grounds. This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by BLM's Authorized Officer.

3. Bald Eagle Winter Concentration Areas - (under the Bald and Golden Eagle Protection

Act and Threatened and Endangered Species Act)

To protect important seasonal wildlife habitat, exploration, drilling, and other developmental activity will be prohibited from December 1 to April 15 on bald eagle winter concentration areas. This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by BLM's Authorized Officer.

4. Crucial Peregrine Falcon Nesting Habitat (Perins Peak and Mesa Verde National Park)

No Surface Occupancy. Operations on these lands will not be approved in order to protect crucial peregrine falcon habitat.

5. Important Peregrine Falcon Nesting Habitat (Paradox Valley Area)

To protect important seasonal wildlife habitat, exploration, drilling, and other developmental activity will be prohibited from March 1 to August 31 on important peregrine falcon habitat. This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by the Authorized Officer.

6. Elk Calving Area

To protect important seasonal wildlife habitat, exploration, drilling, and other developmental activity will be prohibited from May 1 to July 15 on elk calving areas. This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by BLM's Authorized Officer.

7. Dolores River Canyon, Menefee, and Weber Mountains

These areas are receiving special management for their significant recreational and visual values. No Surface Occupancy on the described lands will be approved unless it is shown to the satisfaction of the Authorized Officer that the objectives of such special management can still be met.

PRESENT MANAGEMENT ALTERNATIVE LEASE STIPULATIONS

8. McElmo Research Natural Area (RNA)

The McElmo Research Natural Area is receiving special management for its important habitat for rare species of flora and fauna. No Surface Occupancy on the described lands will be approved unless it is shown to the satisfaction of the Authorized Officer that the objectives of such special management can still be met.

9. Cultural Resources

The following areas are receiving special management for their important archaeological and historical values. No Surface Occupancy on the described lands will be approved unless it is shown to the satisfaction of the Authorized Officer that the objectives of such special management can still be met.

- a. Sand and East Rock Canyons
- b. Cannonball Ruin
- c. Lowery Ruin and Associations
- d. Dominguez-Escalante Ruins
- e. Tabeguache Cave II and Tabeguache Canyon
- f. Dolores Cave
- g. Bull Canyon Rockshelter
- h. Tabeguache Pueblo
- i. McLean Basin Towers
- j. Squaw/Papoose, Cross, and Cahone Canyons
- k. Painted Hand Petroglyphs
- l. Painted Hand Ruin
- m. Indian Henry's Cabin
- n. Lightning Tree Tower Group
- o. Buffer for Hovenweep National Monument
- p. Battle Rock
- q. Easter Ruin
- r. Seven Towers Ruin Group



APPENDIX H

PRESENT MANAGEMENT ALTERNATIVE

CONDITIONS OF APPROVAL



APPENDIX H

PRESENT MANAGEMENT ALTERNATIVE CONDITIONS OF APPROVAL

The Conditions of Approval (COAs) shown in Appendix D will be used to protect resources analyzed within this alternative. In addition to the COAs common to all alternatives, a COA will be appended to approval documents, as needed, to implement the Fragile Soil Areas and Lambing Grounds oil and gas leasing stipulations shown in Appendix G for Little Snake Resource Area.

LITTLE SNAKE RESOURCE AREA

Lambing grounds: Exploration (including seismic exploration, drilling, other development or production activity) will not be allowed on sheep lambing grounds during lambing activity. Lambing activities usually fall between May 1 and June 15 and last for approximately six weeks. This condition may be waived for drilling operations which would require more than nine months to complete and for which it was also shown to the satisfaction of the Authorized Officer that the drilling operations could not avoid taking place in lambing areas during lambing activities.

Fragile Soil Areas: 1) All sediments generated from the surface-disturbing activity will have to be retained on-site. 2) Construction or other surface-disturbing activities will not be allowed when the soils are saturated to a depth of more than three inches. 3) Vehicle use will be limited to existing roads and trails. 4) All new permanent roads will be built to meet primary road standards (BLM standards); their location will be approved by the Authorized Officer. For oil and gas purposes, permanent roads are those used for production. 5) All geophysical and geochemical exploration will be conducted by helicopter, horseback, on foot, or from existing roads. 6) Any sediment-control structures, reserve pits, or

disposal pits will be designed to contain a 100-year, 6-hour storm event. Storage volumes within these structures will have a design life of 25 years. 7) Before reserve pits, production pits, or emergency pits can be reclaimed, all residue will be removed and trucked off-site to an approved disposal site. 8) Reclamation of disturbed surfaces will be initiated before November 1 each year.

Elk Migration Routes.



APPENDIX I

STANDARD TERMS AND CONDITIONS ALTERNATIVE

CONDITIONS OF APPROVAL



APPENDIX I

STANDARD TERMS AND CONDITIONS ALTERNATIVE

CONDITIONS OF APPROVAL

The Conditions of Approval (COAs) shown in Appendices D and F will be used to protect resources analyzed within this alternative. In addition to those COAs, more extensive use of Code of Federal Regulations (CFR) 3101.1-2 (Surface Use Rights) will be made. This section of the CFR defines the BLM's ability to influence the location and timing of a drilling operation. Since lease stipulations can not be written for this alternative, the regulatory authority to limit operations by as much as 60 days would be used to restrict the timing of operations to give at least partial protection to wildlife habitat. The regulatory flexibility of moving a proposed operation 200 meters would be employed as needed to protect raptor nests, fragile soils, riparian areas, etc.

the 1990s, the number of people with a diagnosis of schizophrenia has increased in the United Kingdom (Meltzer 1996). The prevalence of schizophrenia in the United Kingdom is estimated to be 1.2% (Meltzer 1996).

There is a growing awareness of the need to improve the lives of people with a diagnosis of schizophrenia. The United Kingdom has a number of national strategies for mental health care, including the National Service Framework for Mental Health (Department of Health 1999), the National Mental Health Development Plan (Department of Health 2002) and the National Strategy for Mental Health (Department of Health 2003). These strategies emphasize the need to improve the lives of people with a diagnosis of schizophrenia, and to ensure that they have access to the best possible care and support.

One of the key areas of focus in these strategies is the need to improve the lives of people with a diagnosis of schizophrenia. This includes a range of issues, including the need to improve the quality of care and support, to ensure that people have access to the best possible care and support, and to ensure that they are able to live full and meaningful lives. This paper focuses on the need to improve the lives of people with a diagnosis of schizophrenia, and on the role of the family in this process.

The family is a key part of the lives of people with a diagnosis of schizophrenia. It is often the family that provides the most important support and care for people with a diagnosis of schizophrenia. The family can play a crucial role in helping people to live full and meaningful lives, and to manage their condition effectively. This paper explores the role of the family in the lives of people with a diagnosis of schizophrenia, and discusses the challenges that families face in this role.

One of the main challenges that families face is the need to provide care and support for people with a diagnosis of schizophrenia. This can be a demanding and often stressful role, and it is important that families are able to access the support and resources that they need to do this effectively. This paper discusses the challenges that families face in this role, and explores the need for support and resources for families.

Another key challenge that families face is the need to ensure that people with a diagnosis of schizophrenia have access to the best possible care and support. This includes a range of issues, including the need to ensure that people have access to the best possible care and support, to ensure that they are able to live full and meaningful lives, and to ensure that they are able to manage their condition effectively. This paper discusses the challenges that families face in this role, and explores the need for support and resources for families.

Finally, it is important to recognize that the family is not the only source of support and care for people with a diagnosis of schizophrenia. There are a range of other sources of support and care, including professional services, community organizations, and peer support groups. It is important that families are able to access these other sources of support and care, and that they are able to work in partnership with these other sources of support and care. This paper discusses the challenges that families face in this role, and explores the need for support and resources for families.

APPENDIX J

CLIMATIC DATA



APPENDIX J

CLIMATIC DATA

TABLE J-1. CLIMATIC DATA (TEMPERATURES)

Station	Elevation (ft) Mean Sea Level	Temperature (degrees F)				
		Extremes Minimum	Mean Minimum	Annual Mean	Mean Maximum	Extremes Maximum
Glenwood Springs Resource Area						
Aspen	7928	-33	26	41	56	93
Climax	11300	-33	20	31	42	78
Eagle	6497	-51	24	42	60	99
Glenwood Springs	5823	-26	31	47	63	102
Rife	5400	-38	30	47	64	101
Kremmling Resource Area						
DiBon	9065	-45	18	35	53	86
Fraser	8560	-55	13	32	51	98
Grand Lake	8680	-43	18	35	52	90
Green Mtn Dam	7740	-44	25	40	56	89
Hot Sulphur Springs	7800	-42	21	38	54	93
Red Feather Lakes	7600	-39	28	41	54	97
Spicer	8379	-48	23	37	52	91
Walden	7749	-49	20	36	52	91
Little Snake Resource Area						
Crig	6285	-45	27	42	58	99
Hayden	6300	-45	26	42	58	100
Steamboat Springs	6770	-43	18	35	52	90
Yampa	7892	-34	25	39	54	88
Northeast Planning Area						
Akron	4663	-29	35	49	63	105
Altitudepark	8500	-38	28	41	53	91
Benny Dam	3647	-24	36	51	65	109
Bozler	5445	-22	40	53	66	104
Burlington	4165	-25	36	52	67	112
Byers	5200	-31	34	50	66	106
Chesman	6875	-41	29	46	64	99
Cherry Creek Dam	5647	-32	34	50	66	102
Cheyenne Wells	4250	-23	36	52	67	106
Denver Airport	5283	-25	36	50	64	102
Fence Park	7497	-39	30	43	57	92
Flagler	4975	-26	33	49	63	104
Forster	4739	-29	34	51	68	105
Fr. Collins	5001	-41	34	48	62	102
Fr. Lupton	4888	-37	34	50	66	108
Fr. Morgan	4321	-41	34	49	64	105
Georgetown	8500	-26	31	43	56	92
Greeley	4648	-39	33	48	64	106
Grover	5090	-27	34	49	64	104
Holyoke	3746	-23	35	51	66	110
Idaho Springs	7255	-32	28	43	58	94
Julesburg	5469	-24	36	51	66	109
Kessler	5495	-29	37	52	66	102
Kraftman	5130	-30	31	47	63	105
Kitt Carson	4284	-24	34	51	68	109
Limon	5560	-29	33	49	64	104
Lamar	4950	-36	33	49	64	105
Lamar	6300	-38	32	48	64	103
Stirling	3939	-29	34	49	64	106
Stratton	4334	-22	36	51	66	108
Windsor	5250	-31	33	49	64	102
Wray	3575	-24	36	52	68	112
Yuma	4125	-27	36	51	67	108
San Juan/San Miguel Planning Area						
Cortez	6177	-27	33	49	65	100
Durango	6550	-30	29	47	64	97
Fr. Lewis	7595	-35	27	43	58	93
Intero	6424	-34	29	46	64	102
Mesa Verde NP	7070	-20	37	50	63	99
Northdale	6693	-26	29	45	61	97
Pagosa Springs	7238	-46	24	42	60	98
Palmdale Lakes	8092	-25	22	39	56	89
Rico	8842	-36	22	39	56	87
Silverton	9322	-37	19	36	53	85
Vallecito Dam	7650	-35	27	43	59	92

Source: PEDCO Environmental, Inc. (1981)

TABLE J-2. CLIMATIC DATA (PRECIPITATION AND FROST)

Station	Precipitation (Inches)				Frost-free Period		
	Annual Mean	Monthly Maximum	Monthly Minimum	Mean Snowfall	Days	Mean Begin Date	Mean End Date
Glenwood Springs Resource Area							
Aspen	19.3	2.1	1.2	140	76	6/3	8/28
Clifton	23.6	2.6	1.3	278	97	6/27*	7/6*
Engle	10.4	1.2	0.6	48	70	6/9	8/28
Glenwood Springs	16.0	1.7	1.1	63	138	5/17	10/2
Rifle	11.3	1.4	0.7	42	109	5/28	9/14
Kremmling Resource Area							
Dillon	15.7	1.9	0.9	158	6	6/28	7/4
Fraser	19.6	1.8	1.2	119	4	6/29	7/3
Grand Lake	20.2	2.4	1.1	155	7	6/29	7/6
Green Mtn Dam	15.6	1.8	1.0	98	82	6/10	8/31
Hot Sulphur Springs	12.7	1.5	0.8	92	--	---	---
Red Peach Lake	16.5	2.3	0.5	90	71	6/16	8/26
Silver	13.8	1.9	0.8	149	40	6/21	7/31
Walden	9.9	1.5	0.4	49	40	6/22	8/1
Little Snake Resource Area							
Craig	13.4	1.6	0.8	85	94	6/8	9/10
Hayden	16.4	1.6	1.2	107	76	6/11	8/26
Steamboat Springs	24.0	2.8	1.6	165	28	6/23	7/21
Yampa	16.0	2.1	1.1	120	87*	6/5*	9/4*
Northeast Planning Area							
Albion	16.1	3.1	0.4	39	142	5/13	10/2
Allenspark	20.8	2.8	1.0	156	71	6/12	8/22
Benny Dam	15.3	2.7	0.2	27	161	5/6	10/12
Boulder	18.3	3.3	0.6	83	152	5/9	10/8
Burlington	15.7	2.8	0.4	19	151	5/5	10/2
Byers	15.0	2.5	0.4	48	138	5/15	9/30
Chocoma	15.8	2.6	0.4	61	120	5/26	9/23
Cherry Creek Dam	15.5	2.6	0.4	55	146*	5/13*	10/6*
Cheyenne Wells	15.5	2.9	0.2	21	153	5/6	10/4
Deaver Airport	15.5	2.6	0.5	63	160	5/5	10/12
Estes Park	14.2	2.2	0.4	--	95	6/6	9/6
Flagler	15.7	3.4	0.3	28	153*	5/6*	10/6
Ford	11.6	2.5	0.2	28	--	---	---
Ft. Collins	14.7	2.9	0.4	46	146	5/8	10/1
Ft. Lupton	11.7	2.2	0.3	--	148	5/10	10/5
Ft. Morgan	12.7	2.5	0.2	23	151	5/7	10/5
Georgetown	15.9	2.5	0.5	78	120	5/27	9/24
Greeley	11.7	2.4	0.3	27	142	5/11	9/30
Grover	14.2	2.6	0.2	37	132	5/18	9/27
Holyoke	17.6	3.7	0.3	35	145	5/11	10/3
Idaho Springs	15.4	2.4	0.4	86	107	6/3	9/18
Julesburg	17.5	3.6	0.4	20	150	5/7	10/4
Kessler	17.0	3.0	0.5	80	150	5/12	10/6
Kantrich	13.5	2.7	0.2	35	125*	5/8*	9/20*
Kil Cren	13.6	2.2	0.2	23	140	5/9	9/26
Limon	14.5	2.7	0.2	27	143	5/14	10/4
Longmont	12.6	2.5	0.3	39	144	5/9	9/30
Parter	12.6	2.2	0.3	61	131	5/19	9/27
Sterling	14.7	3.1	0.2	21	139	5/10	9/26
Stratton	15.6	2.5	0.3	31	153	5/7	10/7
Waterside	15.6	2.8	0.4	47	126	5/20	9/23
Wray	17.4	3.2	0.3	23	145	5/8	9/2
Yuma	17.2	3.0	0.4	34	143	5/13	10/3
San Juan/San Miguel Planning Area							
Cortez	12.5	1.7	0.4	43	126	5/29	10/2
Delta	18.6	2.6	0.7	67	113*	6/9*	9/29*
Ft. Lewis	17.5	2.3	1.1	79	96	6/13	9/17
Ignacio	13.9	1.8	0.6	40	106	6/7	9/21
Monte Verde NP	17.8	2.3	0.7	79	158	5/24	10/19
Northside	11.9	1.6	0.4	37	98	6/10	9/16
Pagosa Springs	19.0	2.5	0.7	124	58	6/21	8/18
Palazzo Lakes	21.7	3.1	1.0	130	--	---	---
Rico	25.7	2.9	1.1	171	11*	6/21*	7/2*
Silverton	22.4	3.0	1.2	140	10	6/28	7/8
Vallecito Dam	25.1	3.1	1.1	130	112	6/6	9/24

*U.S. Department of Commerce (1982)

Source: PEDCO Environmental, Inc. (1981)

TABLE J-3. SELECTED ATMOSPHERIC DISPERSION DATA

	Annual	Winter	Spring	Summer	Fall
Mixing Depth (m)					
Statewide*					
Morning	350	300	450	350	250
Afternoon	2300	1300	2900	3200	2000
Stability (percent)					
Alton					
Unstable	16	9	14	26	14
Neutral	58	62	65	49	56
Stable	26	29	21	25	30
Aurora					
Unstable	25	16	25	35	24
Neutral	36	36	44	31	32
Stable	39	48	31	34	44
Craig+					
Unstable	9	3	18	7	7
Neutral	51	54	55	43	53
Stable	40	43	27	50	40
Denver					
Unstable	23	13	23	34	22
Neutral	40	43	49	32	38
Stable	37	44	28	34	40
Engle					
Unstable	23	16	21	33	24
Neutral	35	38	44	24	32
Stable	42	46	35	43	44

*Mixing depths are statewide averages.

+BLM, 1983 (GRIFF II DEIS)

Source: PEDCO Environmental, Inc. (1981)

TABLE J-4. STATE AND FEDERAL AIR QUALITY STANDARDS (MICROGRAMS PER CUBIC METER)

		Ambient ^a				Increment ^d						
		Federal		Colorado		Federal			Colorado			
	Averaging Time ^f	Primary	Secondary	Primary	Secondary	Class I	Class II	Class III	Category I	Category II	Category III	
Carbon Monoxide	8 hours	10,000	10,000	10,000	---	---	---	---	---	---	---	
	1 hour	40,000	40,000	40,000	---	---	---	---	---	---	---	
Lead	Quarterly	1.5	1.5	---	---	---	---	---	---	---	---	
Nitrogen Dioxide	Annual	---	---	---	---	---	---	---	---	---	---	
	(Arith.)	100	100	100	---	2.5	25	50	---	---	---	
Oxidants (Ozone)	1 hour	235	235	160	---	---	---	---	---	---	---	
Sulfur Dioxide	Annual	---	---	---	---	---	---	---	---	---	---	
	(Arith.)	80	---	---	---	2	20	40	2	10	15	
	24 hours	365	---	---	---	5	91	182	5	50	100	
	3 hours	---	1300	700	---	25	512	700	25	300	700	
Total Suspended Particulates	Annual	---	---	---	---	---	---	---	---	---	---	
	(Geom.)	75 μ /	60 μ /	75	60 μ /	5	19	37	---	---	---	
	24 hours	260 μ /	150 μ /	260	150	10	37	75	---	---	---	
Inhalable Particulates (PM ₁₀)	Annual	---	---	---	---	---	---	---	---	---	---	
	(Arith.)	50	50	μ /	μ /	---	---	---	---	---	---	
	24 hours	150	150	---	---	---	---	---	---	---	---	

Sources: National Primary and Secondary Ambient Air Quality Standards (40 CFR 50.150, as revised July 1, 1988).

Requirements for Preparation, Adoption and Submittal of Implementation Plans (40 CFR 51.166, as revised July 1, 1988).

Code of Colorado Regulations (Volume 5, Part 14, as amended May 27, 1980).

^a Short-term standards (those other than Annual and Quarterly) are not to be exceeded more than once each year, except the federal ozone and PM₁₀ standards.Under federal regulations, the "expected number of days" with ozone or PM₁₀ levels above the standard is not to be exceeded more than once per calendar year.^b Ambient standards are the absolute maximum level allowed to protect either public health (primary) or welfare (secondary).^c Incremental (Prevention of Significant Deterioration) standards are the maximum incremental amounts of pollutants allowed above the baseline in regions of clean air.^d Federal TSP standards were superseded by the Federal PM₁₀ standards, effective July 31, 1987. The TSP standards will be phased out over time.^e The Colorado annual secondary TSP standard was established as a guide in assessing implementation plans to achieve the 24-hour standard.^f Colorado is developing PM₁₀ standards at least as stringent as the Federal standards.

TABLE J-5. ASSUMED BACKGROUND POLLUTANT CONCENTRATION VALUES
(MICROGRAMS PER CUBIC METER)

Location	CO		Lead	NO2		O3		SO2		TSP		PM10	
	1 hr Max	8 hr Max	Quart Mean	Ann Arlt Mean	2nd 1 hr Max	Ann Arlt Mean	2nd 3 hr Max	2nd 24 hr Max	Ann Geo Mean	2nd 24 hr Max	Ann Arlt Mean	2nd 24 hr Max	
Glenwood Springs Resource Area													
Rural	2300	2300	.05	28	167	3	131	210	25	85	25	85	
Aspen	20700	6900	.1	28	167	3	131	210	70	230	50	110	
Avon	20700	6900	.3	28	167	3	131	210	35	110	35	110	
Engle	2300	2300	.3	28	167	3	131	210	95	210	50	110	
Snowmass	20700	6900	.3	28	167	3	131	210	30	75	30	75	
Vail	20700	6900	.3	28	167	3	131	210	75	270	35	110	
Kremmling Resource Area													
Rural	2300	2300	.05	28	167	3	131	210	40	105	40	105	
Kremmling	2300	2300	.05	28	167	3	131	210	40	105	40	105	
Brookridge	20700	6900	.3	28	167	3	131	210	70	245	35	110	
Little Snake Resource Area													
Rural	1725	1150	.06	4	167	5	29	18	20	70	20	70	
Craig	2300	2300	.06	4	167	5	29	18	70	185	30	110	
Glenwood Spgs	2300	2300	.06	4	167	5	29	18	60	205	40	80	
Rifle	2300	2300	.06	4	167	5	29	18	80	315	40	160	
Steamboat Spgs	20700	6900	.3	47	167	3	131	--	84	300	50	110	
Northeast Planning Area													
Lincoln Rural	2300	2300	.05	2	169	0	8	5	30	90	30	90	
Jeffco Rural	3910	2530	.4	23	196	18	176	47	30	75	30	75	
Weld Rural	2300	2300	.05	8	167	3	18	8	25	100	25	100	
Castle Rock	39100	25300	.5	30	196	18	176	47	80	195	40	110	
Downtown Denver	42530	25300	.8	90	225	31	320	128	135	415	45	260	
Estes Park	11500	8050	.3	8	172	3	18	8	35	100	35	100	
Ft. Collins	32545	16330	.5	8	178	3	18	8	60	165	35	100	
Ft. Lupton	11500	8050	.3	8	172	3	18	8	50	150	40	110	
Creeley	26795	14605	.5	8	202	3	18	8	55	185	40	90	
Johnstown	11500	8050	.3	8	172	3	18	8	90	350	40	110	
Limon	2300	2300	.04	2	169	0	8	5	35	110	35	110	
Loweland	11500	8050	.3	8	172	3	18	8	70	225	35	100	
Platteville	11500	8050	.3	8	172	3	18	8	70	195	40	110	
Sterling	2300	2300	.15	23	169	3	--	21	65	175	40	110	
San Juan/San Miguel Planning Area													
Rural	2300	2300	.05	4	98	13	26	26	15	50	15	50	
Durango	2300	2300	.7	4	98	13	26	26	65	195	30	90	
Mesa Verde NP	2300	2300	.01	4	98	13	26	26	10	30	10	50	

Source: Chlick (1989)

Underlined values indicate potential Ambient Air Quality Standard violations.

Air quality values are generalized indicators for broad geographic regions. Site-specific monitoring is necessary to determine local conditions.

APPENDIX K

EXISTING ENVIRONMENT— GLENWOOD SPRINGS RESOURCE AREA

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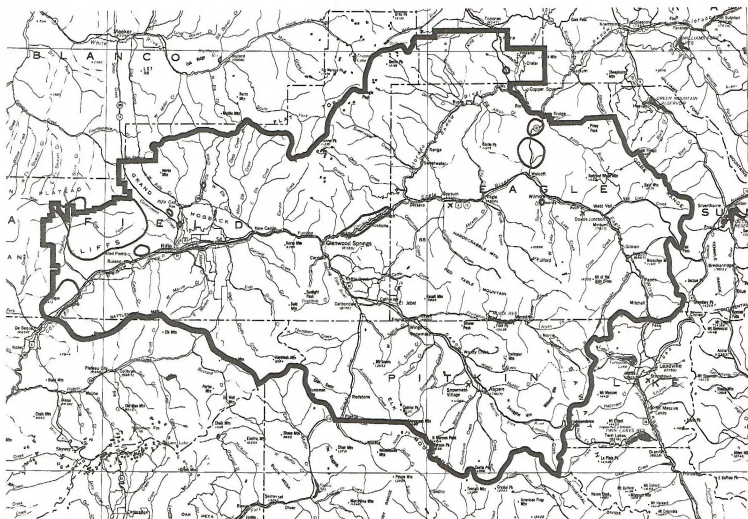
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APPENDIX K



EXISTING ENVIRONMENT—GSRA

TABLE K-1. POPULATIONS OF COLORADO RIVER
CUTTHROAT TROUT IN THE GLENWOOD SPRINGS
RESOURCE AREA.

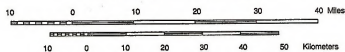
Location	Miles Surface Area	Year Sampled	Rating
Abrams Creek	1.9	1980	A-
Hack Lake	2.0	1980	A
Mitchell Creek	0.8	1984	A+
East Fork Parachute Creek	6.4	1983	B+
JQS Gulch	1.4	1983	B+
East Middle Fork			
Parachute Creek	1.2	1981	C
Northwater Creek	4.2	1983	C
Possum Creek	4.7	1980	C
Red Dirt Creek	1.0	1986	C
Trapper Creek	5.7	1983	C



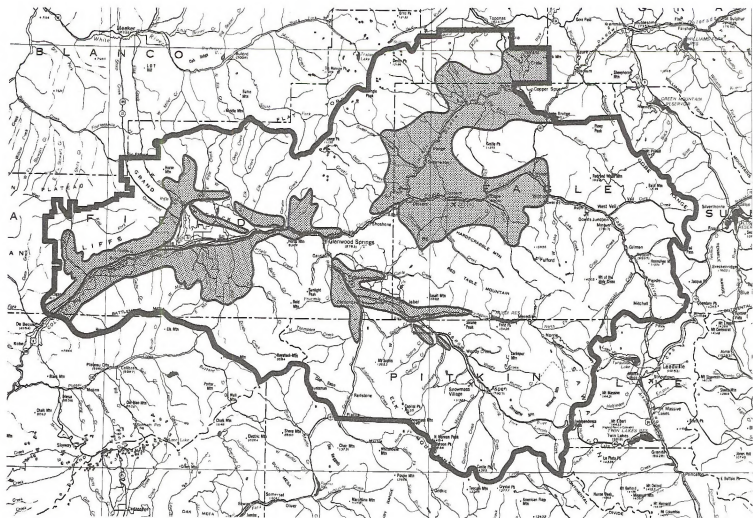
GLENWOOD SPRINGS RESOURCE AREA

-  Resource Area Boundary
-  Major Plant Concentrations

Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map K-1 Major Concentrations of T&E and Candidate Plants



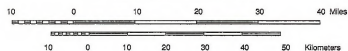
GLENWOOD SPRINGS RESOURCE AREA



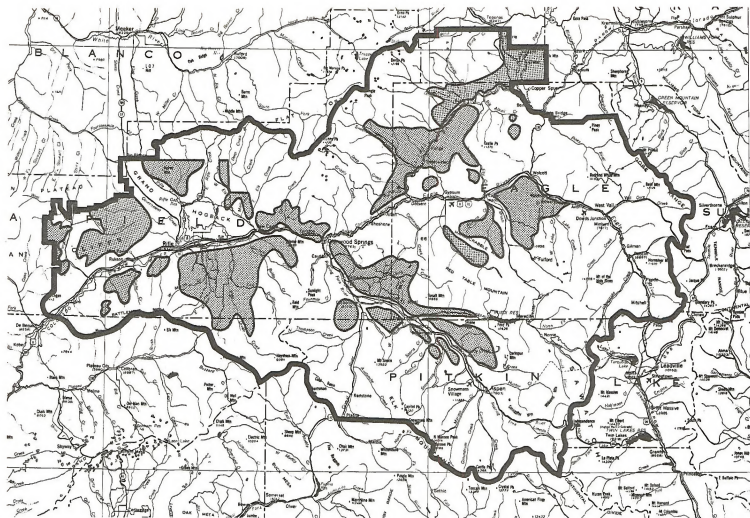
Resource Area Boundary

Muledeer Crucial Habitat

Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map K-2 Muledeer Crucial Habitat



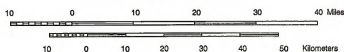
GLENWOOD SPRINGS RESOURCE AREA



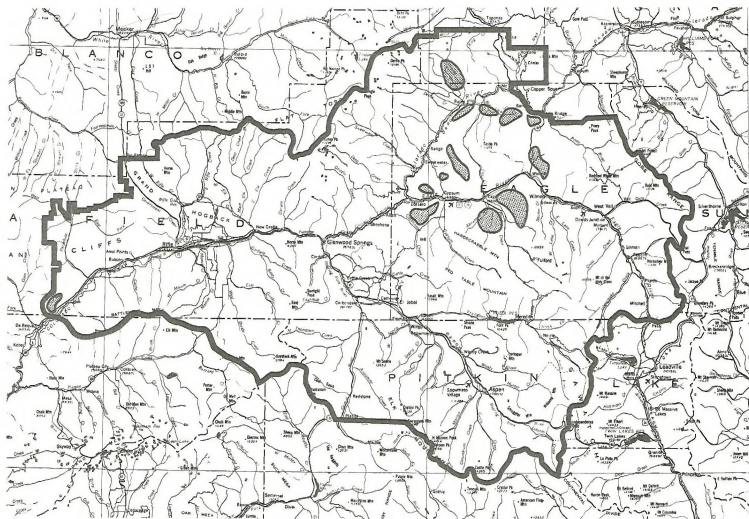
Resource Area Boundary

Elk Crucial Habitat

Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map K-3 Crucial Elk Habitat

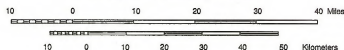


GLENWOOD SPRINGS RESOURCE AREA

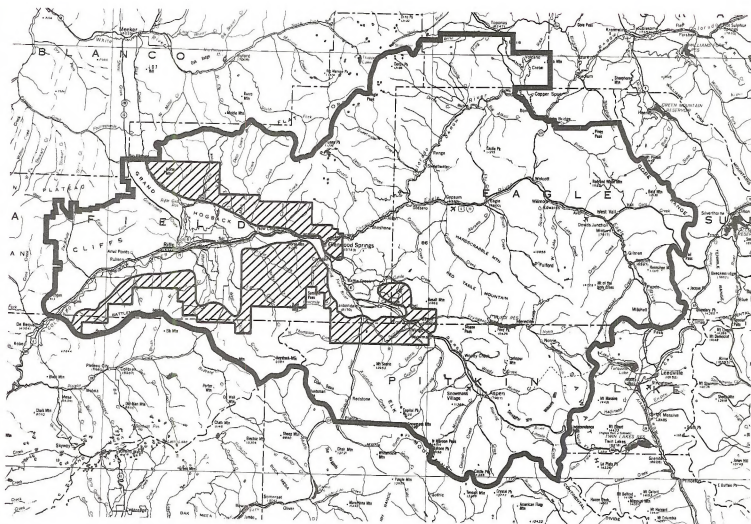


Resource Area Boundary
Sage Grouse-Lek Habitat

Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map K-5 Sage Grouse Winter/Lek Habitat

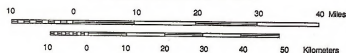


GLENWOOD SPRINGS RESOURCE AREA

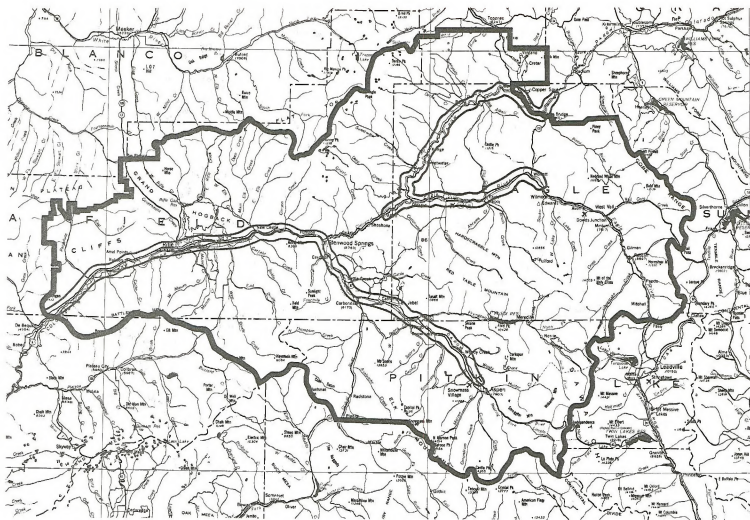


Resource Area Boundary
Turkey Range

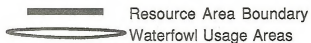
Scale 1:1,000,000
1 Inch equals Approximately 16 miles



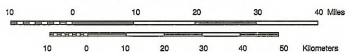
Map K-6 Overall Turkey Range



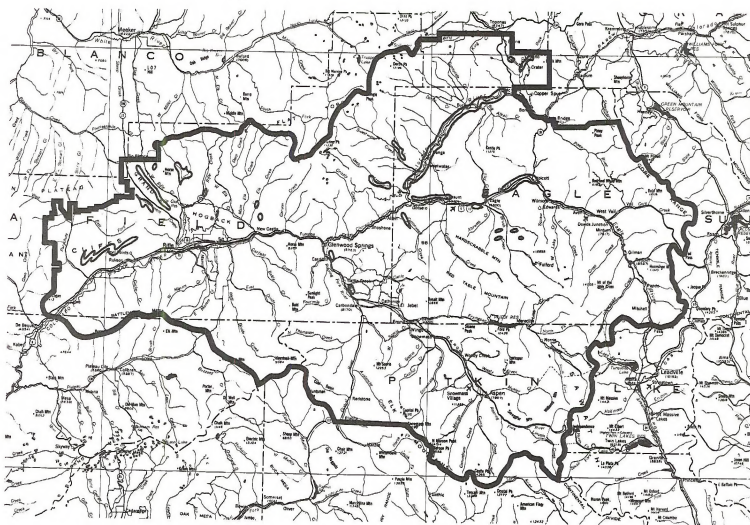
GLENWOOD SPRINGS RESOURCE AREA



Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map K-7 Major Waterfowl Use Areas



GLENWOOD SPRINGS RESOURCE AREA

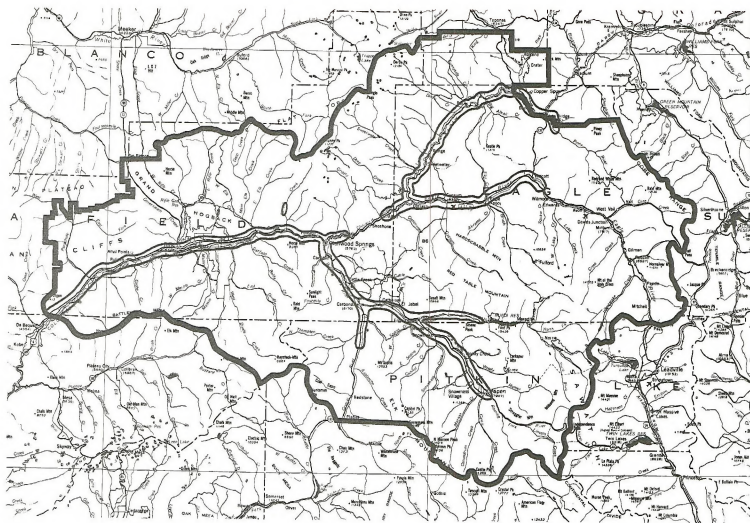


Resource Area Boundary
Raptor Areas



Scale 1:1,000,000
1 inch equals Approximately 16 miles



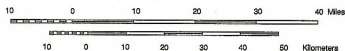
Map K-8 Raptor Concentration Areas



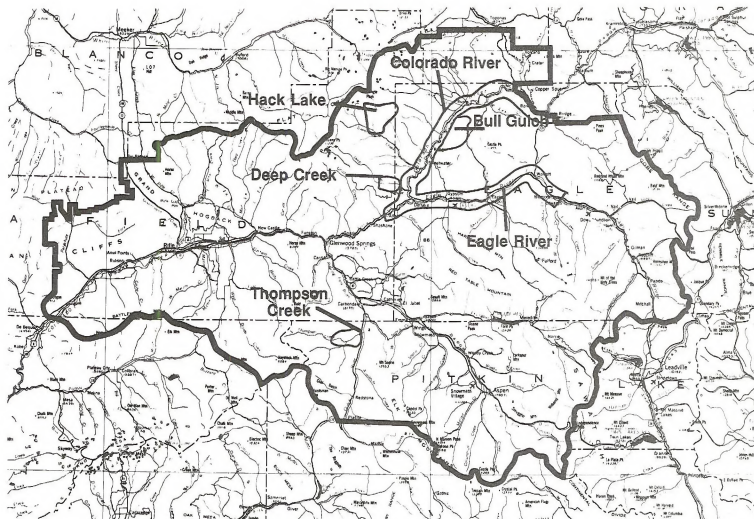
GLENWOOD SPRINGS RESOURCE AREA

-  Resource Area Boundary
-  Bald Eagle and Blue Heron Areas



Scale 1:1,000,000
1 inch equals Approximately 16 miles



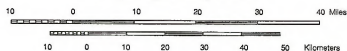
Map K-9 Bald Eagle and Great Blue Heron Areas



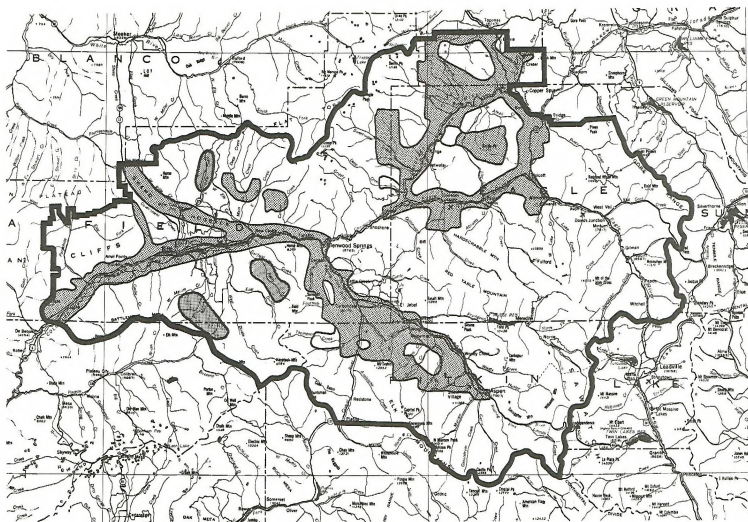
GLENWOOD SPRINGS RESOURCE AREA

-  Resource Area Boundary
-  Special Recreation Management Areas

Scale 1:1,000,000
1 inch equals Approximately 16 miles




Map K-10 Special Recreation Management Areas



GLENWOOD SPRINGS RESOURCE AREA

 Resource Area Boundary

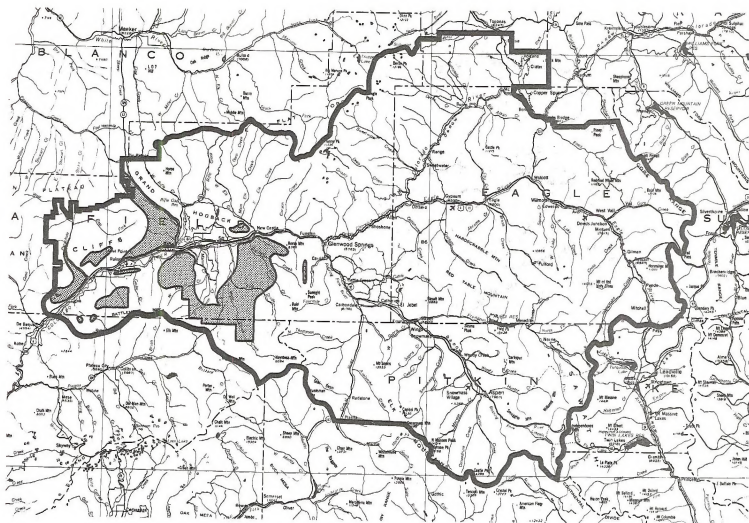
 Class I

 Class II

Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map K-11 Visual Resource Management



GLENWOOD SPRINGS RESOURCE AREA



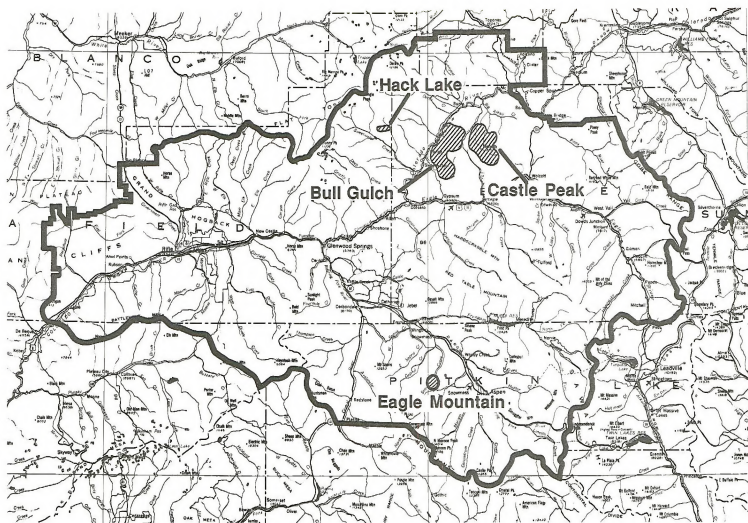
Resource Area Boundary

Paleontological Areas

Scale 1:1,000,000
1 inch equals Approximately 16 miles



Map K-12 Sensitive Paleontological Areas



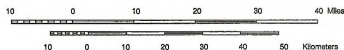
GLENWOOD SPRINGS RESOURCE AREA



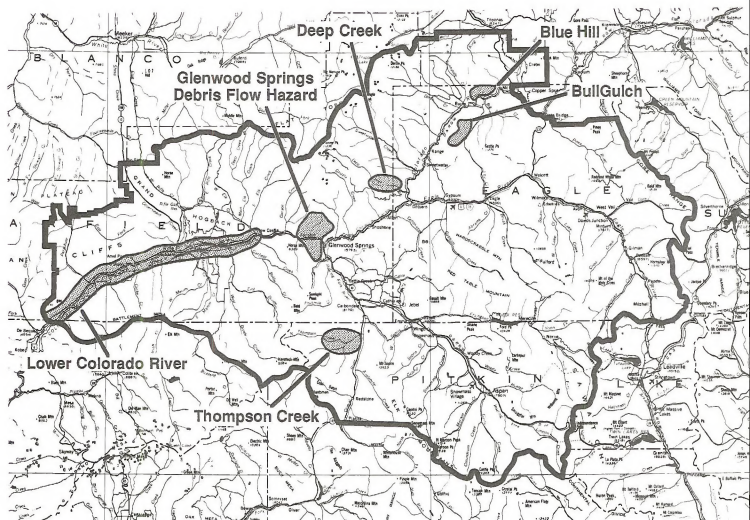
Resource Area Boundary

Wilderness Study Areas



Scale 1:1,000,000
1 inch equals Approximately 16 miles

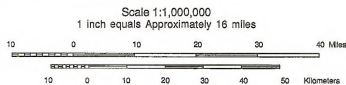


Map K-13 Wilderness Study Areas



GLENWOOD SPRINGS RESOURCE AREA

-  Resource Area Boundary
-  Areas of Critical Environmental Concern



Map K-14 Areas of Critical Environmental Concern



APPENDIX L

EXISTING ENVIRONMENT— LITTLE SNAKE RESOURCE AREA



APPENDIX L

EXISTING ENVIRONMENT —LSRA

TABLE L-1. COLORADO BLM SENSITIVE PLANTS KNOWN TO OCCUR IN MOFFAT COUNTY

Scientific Name	Common Name
<u>Aster perelegans</u>	Nuttall aster
<u>Astragalus aretioides</u>	cushion milkvetch
<u>Astragalus detritalis</u>	debris milkvetch
<u>Astragalus duchesnensis</u>	Duchesne milkvetch
<u>Astragalus hamiltonii</u>	Hamilton milkvetch
<u>Astragalus jejunus</u>	starving milkvetch
<u>Astragalus nelsonianus</u>	Nelson milkvetch
<u>Astragalus wetherilli</u>	Wetherill's milkvetch
<u>Cirsium owenbeyi</u>	Owenby thistle
<u>Cryptantha caespitosa</u>	caespitose cryptantha
<u>Cymopterus duchesnensis</u>	Duchesne bisquitroot
<u>Draba junipera</u>	juniper draba
<u>Erigeron uintahensis</u>	Uintah fleabane
<u>Eriogonum acaule</u>	mat buckwheat
<u>Eriogonum saurinum</u>	Dinosaur buckwheat
<u>Eriogonum tumulosum</u>	tumor buckwheat
<u>Eriogonum viridulum</u>	little green buckwheat
<u>Leptodactylon watsonii</u>	Watson's buckwheat
<u>Minuartia nuttallii</u>	Nuttall's sandwort
<u>Nama densus</u> vary. <u>parviflorum</u>	small-flowered nama
<u>Parthenium ligulatum</u>	Uintah Basin feverfew
<u>Penstemon gibbensii</u>	Gibbon's beardtongue
<u>Penstemon yampaensis</u>	Yampa beard tongue
<u>Sphaeromeria capitata</u>	capitate chicken-sage
<u>Townsendia strigosa</u>	hairy townsendia
<u>Trifolium andinum</u>	Andy's clover

Note: Specific information on each taxon's habitat, biology, localities, and status is contained in the files at the Craig District Office and in the report submitted by the Colorado Natural Heritage Inventory prepared by J. Scott Peterson entitled, "Botanical Field Survey Study on BLM Public Lands, Volume II," 1983, which is also available at the Craig District Office.

APPENDIX L

TABLE L-2. WILD HORSE CENSUS DATA

Year	Mode of Observation	Bands	Studs	Mares	Yearlings	Colts	Total
1971	Fixed Wing	NI 1/	NI	NI	NI	NI	65
1974	Helicopter	18	25	78	2	27	132
1976	Ground Sample	14	38	50	9	19	116
1977	Helicopter	20	NI	NI	NI	NI	124
1977	Ground Sample	56	NI	NI	NI	NI	350
1979	Helicopter	52	NI	NI	NI	NI	335 2/
1980	Helicopter	23	NI	NI	NI	23	184
1981	Helicopter	24	NI	NI	NI	24	183
1982	Helicopter	11	NI	NI	NI	NI	125
1985	Helicopter	24	NI	NI	NI	NI	173
1987	Helicopter	25	NI	NI	NI	NI	205
1988	Helicopter	32	NI	NI	NI	91	418 3/

1/ Not Identified

2/ Roundup removed 112 of these horses.

3/ Roundup removed 239 of these horses.

3/ Part of these horses moved back into Wyoming.

TABLE L-3. ARCHAEOLOGICAL SITE TYPES

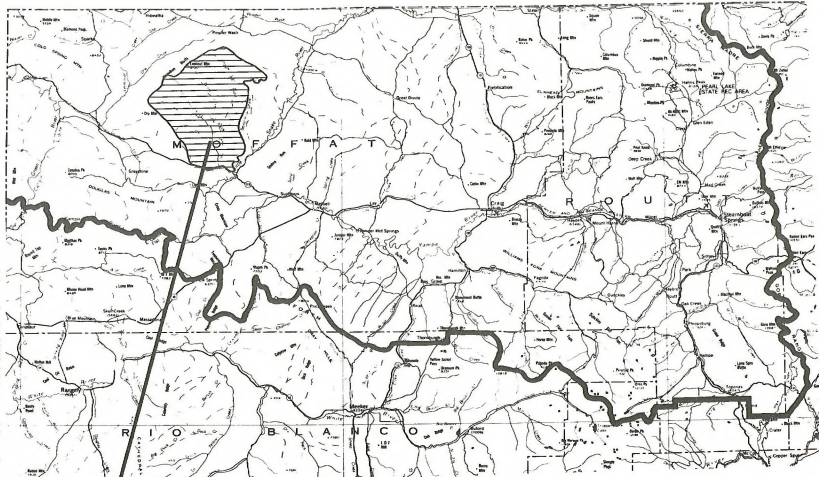
Kind	Characteristics
Lithic scatter (open lithic, chippings, chipping station)	Area where the waste from the manufacture of stone tools or the tools themselves are found.
Campsite (habitation, camp, burnt spots, fire pots, hearths)	A lithic scatter with the addition of features connected spots, fire pots, hearths) with fire making: charcoal, ash, fire-cracked rocks, or burnt bone. A campsite may also be a hearth, with no associated cultural materials.
Quarry (chippings, manufacturing areas)	An area containing a natural source of rocks suitable for making tools. Unmodified rock, waste, and tools in all stages of manufacture are found.
Kill site (trap, jump)	An area containing stone and/or bone tools in association with the remains of one or more animals.
Rock shelter (cave, overhang)	An area protected from the weather by an overhanging rock formation. Usually has a drip line. May or may not have surface culture material.
Rock art (a) pictograph (b) petroglyph	Any artistic expression or message on a rock surface. (a) Painted figures of people, animals, plants, letters, numbers, or abstracts. (b) Incised figures of people, animals, plants, letters, numbers, or abstracts.
Burial	Remains of human beings, fragmentary or whole.
Tipi rings (stone circles, tipis)	Circular arrangement of spaced rocks, three to 15 meters in diameter.
Wickiup (tipi poles)	Poles or branches of pinyon or juniper laid up against living trees. Interior floored with juniper bark.
Granary (cist, corncrib)	Mud-mortared sandstone slab structures, usually about 1.5x1.5x1.5 meters. Most often built into sandstone ledges, sometimes mud-lined and capped or lidded with a large slab.
Rock walls (forts)	Alignments or walls of mud-mortared or dry-laid stone masonry. May be single or multiple. May have "doorway," usually built on ridge.

Words in parentheses are synonyms for that kind of site.

EXISTING ENVIRONMENT
--LSRA

TABLE L-4. HISTORIC SITE TYPES

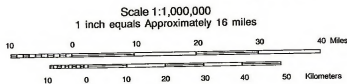
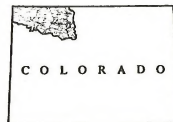
Kind	Characteristics
Trails	Identified routes followed by early explorers or by many emigrants. Physical evidence may (Overland) or may not (Dominguez-Escalante) remain.
Fort	Military establishments for the protection of persons or property. Also gathering and exchange points before the establishment of towns.
Stage stations	Wayfarers' resting places and fresh harness animal acquisition points.
Homestead	One or more structures of varied size, shape, and materials used to shelter isolated Euro-American families claiming land under various homestead laws.
Ranch	Cluster of structures of single and multiple uses associated with a livestock-based family economic operation.
Railroad	Roadbed, tracks, trestles, bridges, depots, and rolling stock associated with early (and continued) industrial transportation of goods and people.
Town	Aggregation of structures sheltering domestic, business, education, social, political, and religious activities. Individual structures may be single or multiple use, but population is multifamily.
Unique structure	Any structure's merit is associated with a particular person.
Site	The location where a historic event occurred but no tangible evidence remains of the action itself.
Architectural	A structure's merit is its manner or style of construction.
School	A structure built for educational purposes but whose historical function is as a community center in the absence of nearby towns.
Community center	A structure, often a public school, which provides a relatively local meeting place for residents of areas with few towns.
Mine	An outcropping of valuable mineral resource and the structures associated with the removal activity.
Reclamation projects	Structures associated with irrigation, water and soil retention, or flood control. These are usually engineering features.

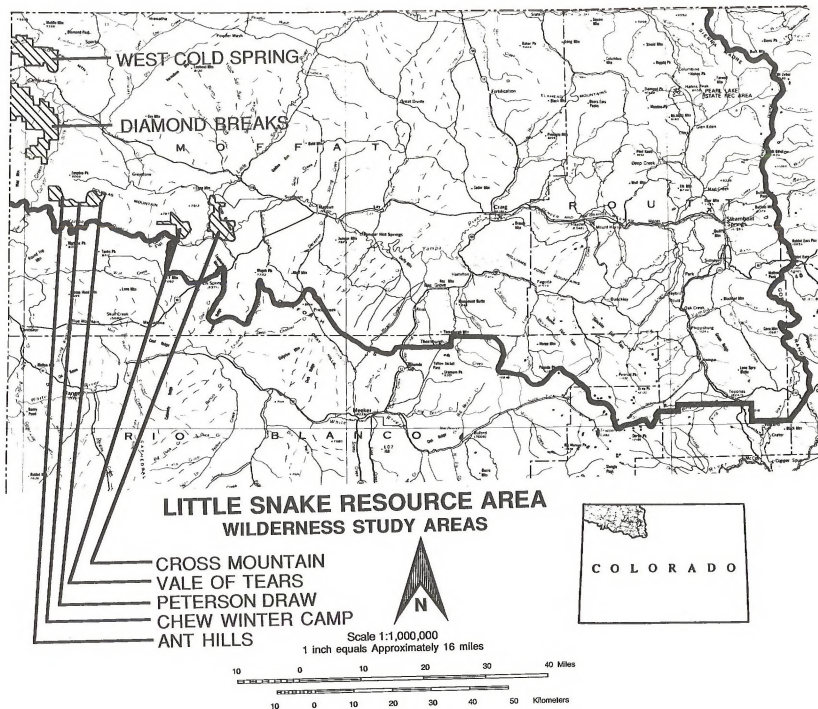


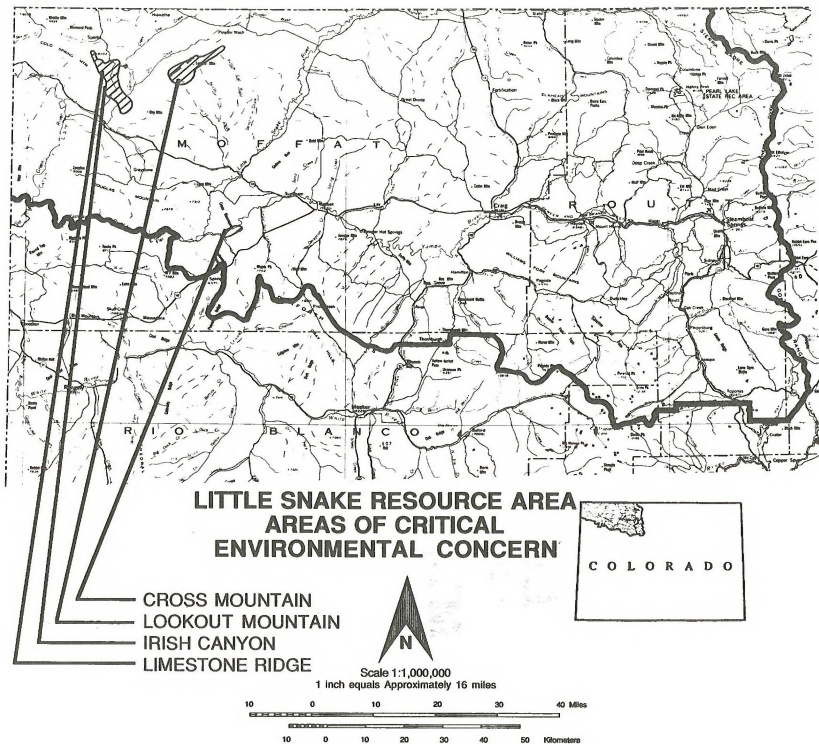
LITTLE SNAKE RESOURCE AREA OIL AND GAS PLAN AMENDMENT

SAND WASH

WILD HORSE USE AREAS







APPENDIX M

EXISTING ENVIRONMENT— SAN JUAN/SAN MIGUEL PLANNING AREA



APPENDIX M

EXISTING ENVIRONMENT— SJ/SMPA

TABLE M-1. MILES OF STREAM AND
RIPARIAN HABITAT NOT
INVENTORIED WITHIN SAN JUAN/SAN
MIGUEL PLANNING AREA.*

Stream name	BLM miles
San Miguel River	25.0
Huff Gulch	1.5
Goat Creek	0.5
Little Bucktail Creek	1.5
Big Bucktail Creek	3.0
Coal Canyon	11.0
Campbell Creek	7.0
Spring Creek	8.0
Subtotal	57.5
Dolores River	120.0
Little Gypsum Creek	4.0
San Miguel Creek	6.0
Bush Canyon	6.0
Bill Creek (tributary to Bush Canyon)	2.0
Spring Creek (tributary to Disappointment Creek)	9.0
Subtotal	147.0
Animas River	15.0
Ruby Creek	1.0
Elk Creek	1.5
Molas Creek	1.5
Cement Creek	4.0
Subtotal	23.0
Streams (SW portion of RMP Area)	
Cross Canyon	16.0
Hovenweep Canyon	10.0
Yellowjacket Canyon	8.0
Sandstone Canyon	9.0
Rock Canyon	5.0
Sand Canyon	3.0
Goodman Canyon	4.0
Subtotal	55.0
Total	282.5

* These estimated stream miles and riparian
habitat areas are considered to have enough
potential to warrant further investigation for
watershed and aquatic/riparian habitat
improvement.

Source: BLM Data, 1989

APPENDIX M

TABLE M-2. MILES OF STREAM AND STREAM HABITAT QUALITY IN THE SAN JUAN/SAN MIGUEL PLANNING AREA.

Stream name	BLM miles	Aquatic/riparian habitat condition	Species Present ¹	Pool riffle (ratio percent) ²	CDOV fishery values ³
Atkinson Creek	5	Fair	None	40:60	None
Beaver Creek	17	Fair	Rb,Ct,U	ND	Poor
Big Bear Creek	5	Fair	Bk,Ct	30:70	Below Average
Coyote Wash	4	Good	U	20:80	None
Disappointment Creek	22	Poor	U	10:80	ND
Elk Creek	1	Excellent	Ct	80:20	Below Average
Fall Creek	7	Fair	Rb,Bk,Bn,Ct,U	70:30	Below Average
LaSal Creek	12	Fair	S,D,Sc	30:70	ND
Leopard Creek	4	Fair	Rb,Bk,Ct	10:90	Excellent
Mesa Creek (South fork)	11	Fair	Rb,D,U	45:55	Below Average
Naturita Creek	32	Poor	Rb,S,D	10:90	Poor
Roc Creek	4	Fair	Ct,U	40:60	ND
Salado Creek	3	Good	Bk,U	50:50	Average
Specie Creek	2	Fair	None	70:30	None
Tabeguache Creek	15	Poor	Rb,Bn,S	ND	None
Total	144				

¹ Rb=rainbow, Bn=brown, Bk=brook, Ct=cutthroat, U=unidentified species, Sc=sculpin, S=sucker, D=Dace.

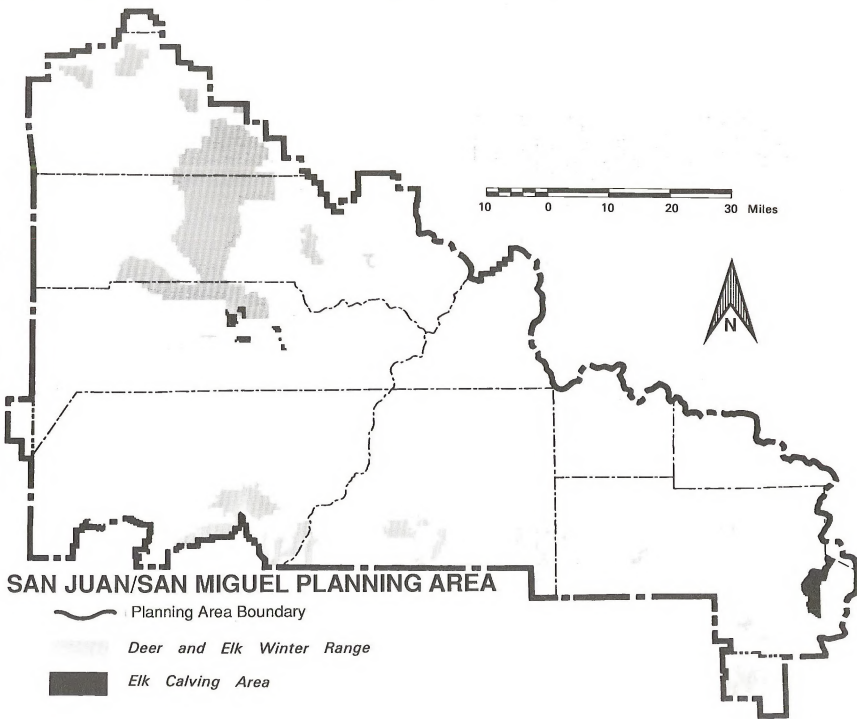
² Assuming that higher quality streams would approach a 50:50 ratio.

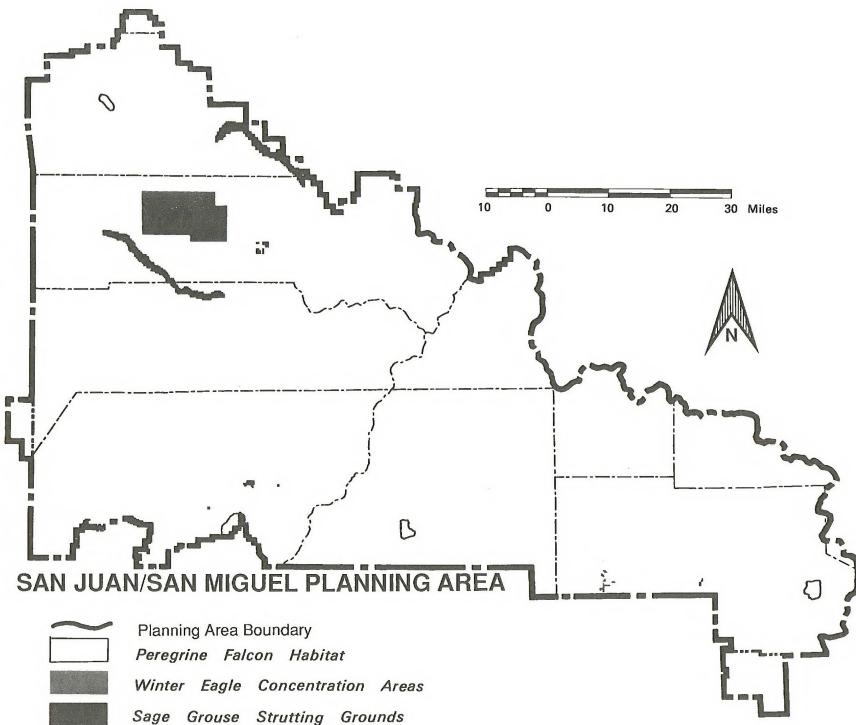
³ Fishery value is not necessarily representative of potential habitat quality in terms of BLM's philosophy of habitat management as opposed to species management.

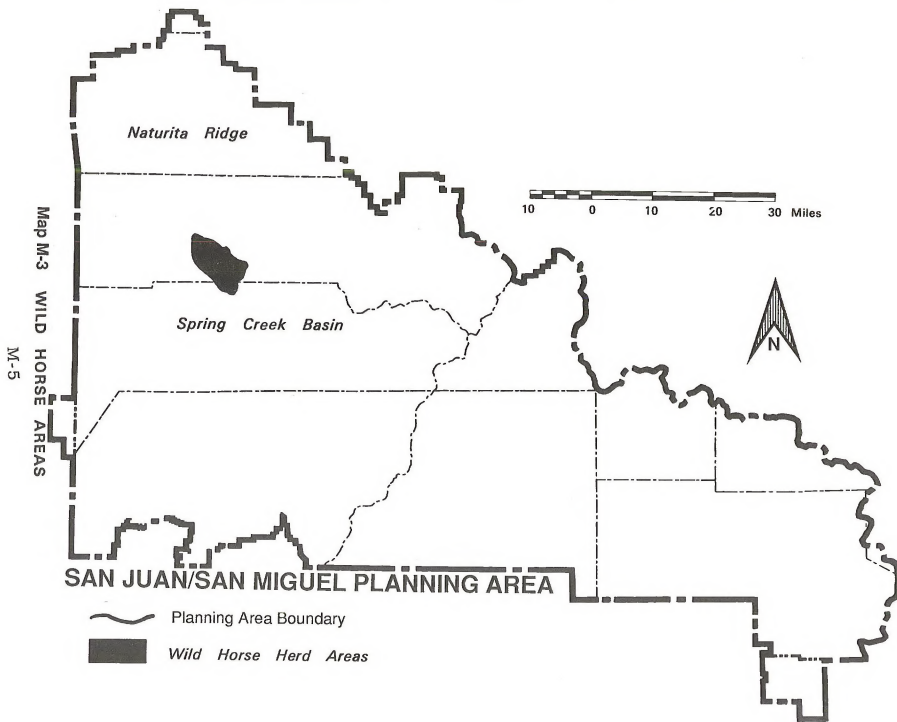
Source: BLM Data, 1989.

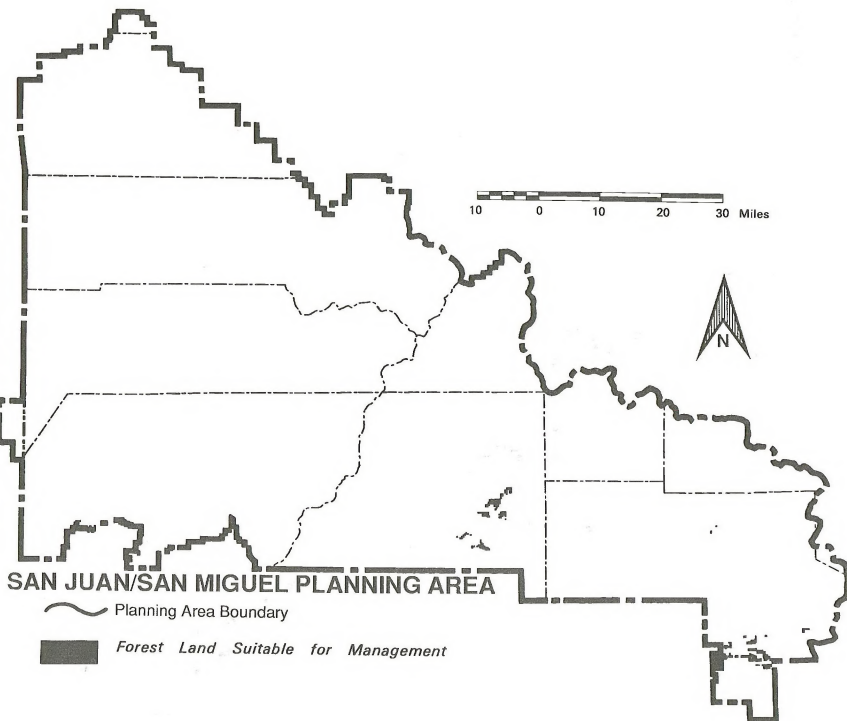
TABLE M-3. SENSITIVE SPECIES

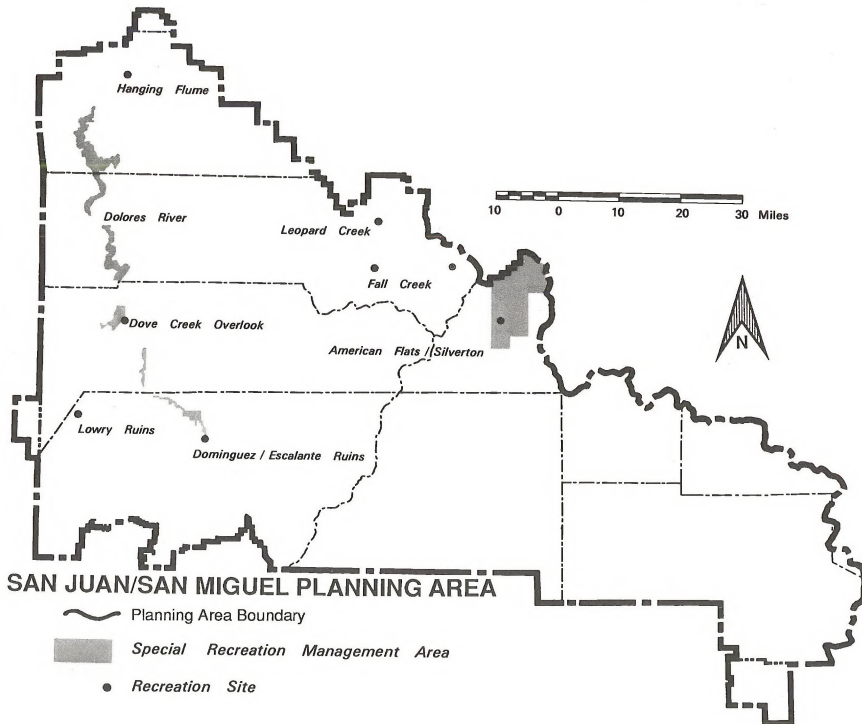
Federally Listed Species	
Bald eagle	<u>Haliaeetus leucocephalus</u>
Peregrine falcon	<u>Falco peregrinus</u>
Black-footed ferret	<u>Mustela nigripes</u>
Colorado squawfish	<u>Ptychocheilus lucius</u>
Humpback chub	<u>Gila cypha</u>
Bonytail chub	<u>Gila elegans</u>
Federal Candidate Species	
Boreal western toad	<u>Bufo boreas boreas</u>
North American wolverine	<u>Gulo gulo</u>
Swift fox	<u>Vulpes velox</u>
White-faced ibis	<u>Plegadis chihi</u>
Ferruginous hawk	<u>Buteo regalis</u>
Southwestern otter	<u>Lutra canadensis</u>

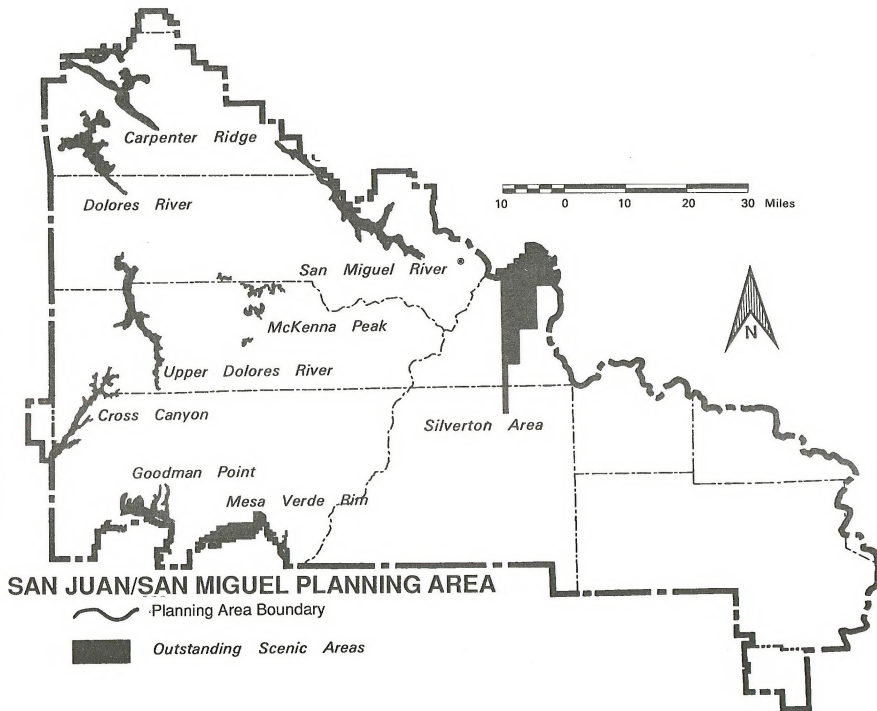


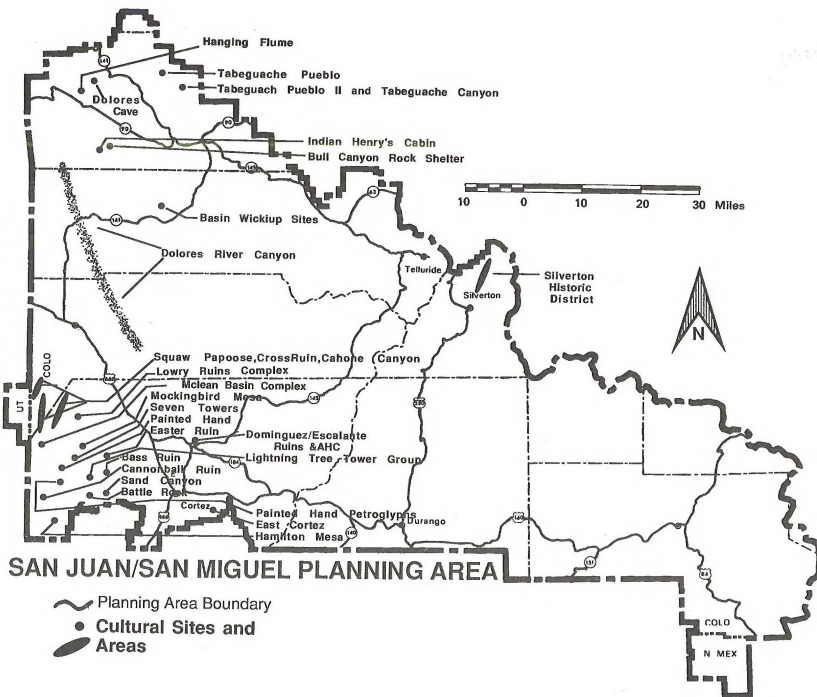


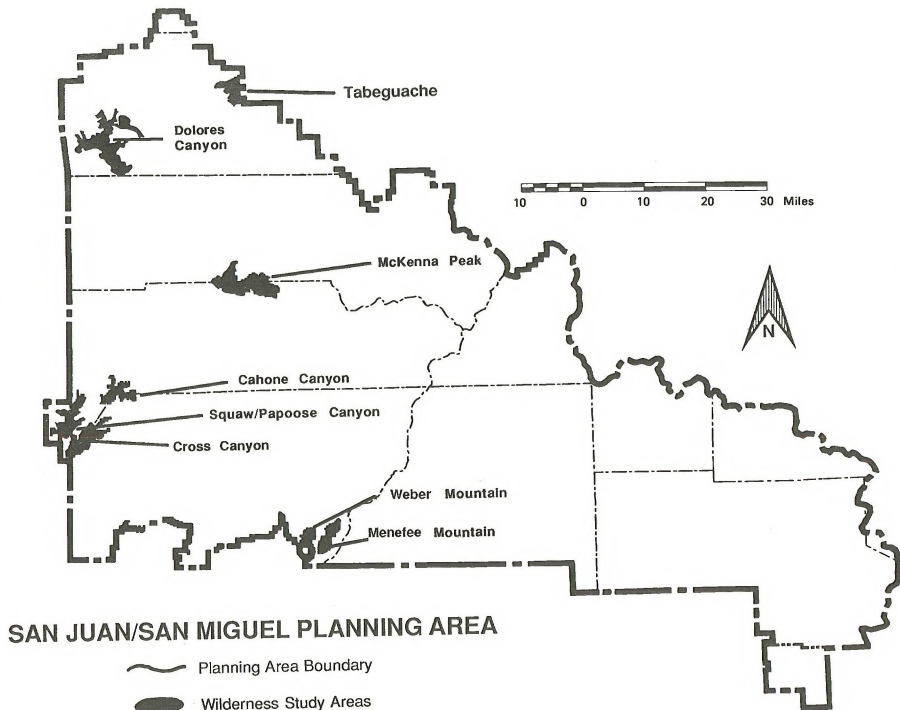


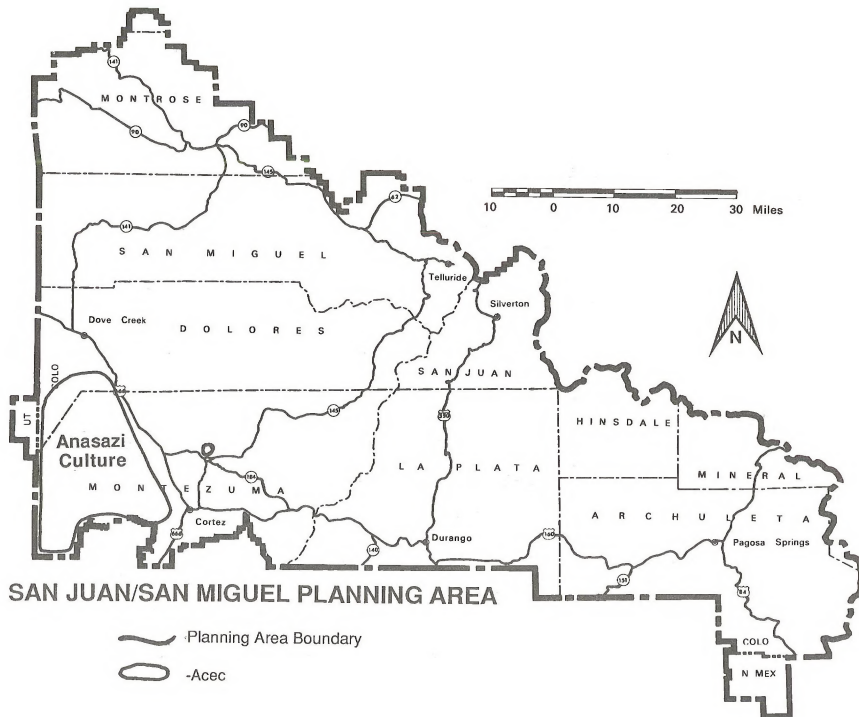










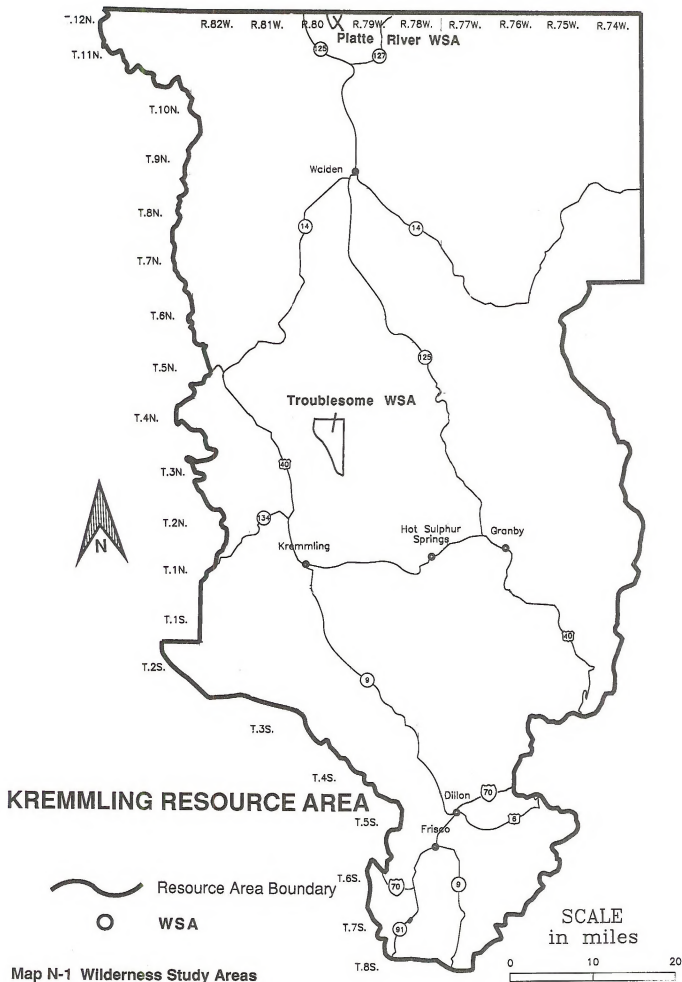


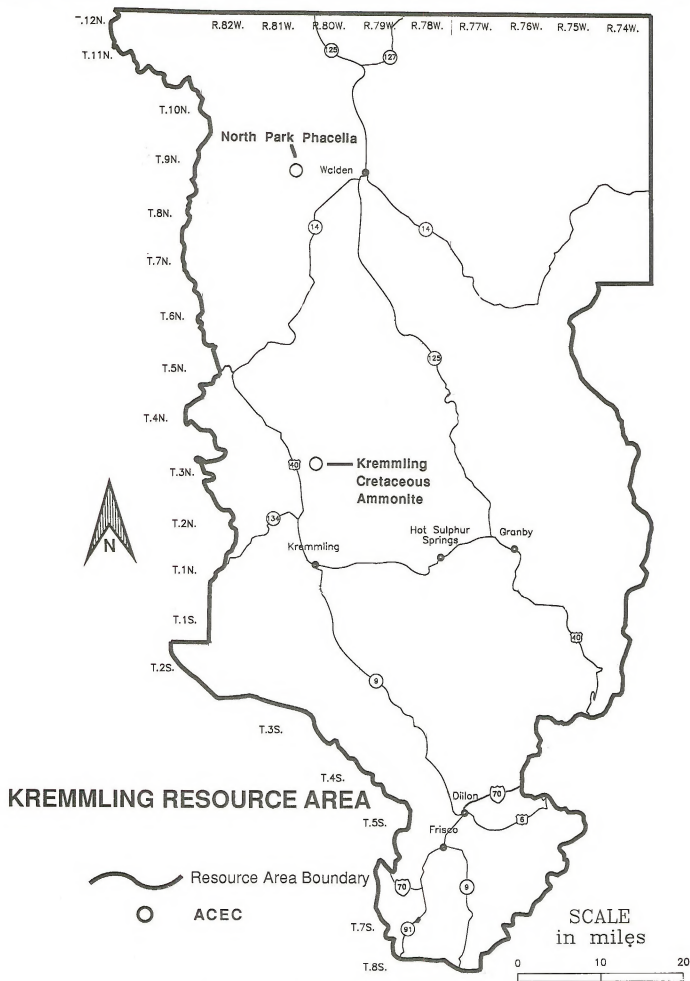


APPENDIX N

EXISTING ENVIRONMENT— KREMMLING RESOURCE AREA







Map N-2 Areas of Critical Environmental Concern

APPENDIX O

**SOCIAL AND
ECONOMIC TABLES**

APPENDIX O

SOCIAL AND ECONOMIC

**TABLE O-1. SOCIOECONOMIC INDICATORS
GLENWOOD SPRINGS RESOURCE AREA**

	1977	1982	1987	% Change	
				1977-82	1982-87
Mesa County					
Population	67,294	94,075	86,498	39.8	-8.1
Employment	34,169	49,186	43,515	43.9	-11.5
Personal Income *	496.8	1,063.2	1,126.3	114.0	5.9
Garfield County					
Population	18,992	28,751	25,655	51.4	-10.8
Employment	9,799	17,031	14,893	73.8	-12.6
County Revenue	4.5	13.4	11.9	294.2	-10.9
Personal Income *	146.4	376.0	365.4	156.8	-2.8

* Million dollars.

TABLE O-2. POPULATION--KREMMLING RESOURCE AREA

	1960	1970	1980	1987	Percent Change		
					1960-70	1970-80	1980-87
Grand County	3,557	4,107	7,475	9,548	15	82	28
Fraser-Winter Park	N/A	509	950	1,438	N/A	87	50
Granby	503	554	963	1,341	10	74	39
Grand Lake	170	189	382	508	11	102	35
Hot Sulphur Springs	237	220	405	458	-7	84	13
Kremmling	576	764	1,296	1,461	33	70	13
Jackson County	1,758	1,811	1,863	1,653	3	3	-11
Walden	809	907	947	832	12	4	-12
Total Resource Area	5,315	5,918	9,338	11,201	11	58	20
State of Colorado	1,753,925	2,207,259	2,888,834	3,296,269	26	31	14
United States	179,323,175	203,212,926	226,504,825	243,399,000	13	11	7

APPENDIX O

**TABLE O-3. LABOR FORCE, EMPLOYMENT & UNEMPLOYMENT RATE
KREMMLING RESOURCE AREA**

	1975	1980	1986
GRAND COUNTY			
Labor Force	3,995	5,626	4,979
Employment	3,817	5,450	4,726
Unemployment Rate	4	3	5
JACKSON COUNTY			
Labor Force	891	842	959
Employment	849	792	908
Unemployment Rate	4	5	5
ECONOMIC STUDY AREA			
Labor Force	4,886	6,468	5,938
Employment	4,666	6,242	5,634
Unemployment Rate	4	3	5
GRAND COUNTY			
Population	6,446	7,547	9,682
JACKSON COUNTY			
Population	1,724	1,889	1,603
ECONOMIC STUDY AREA			
Population	8,170	9,436	11,285

**TABLE O-4. EMPLOYMENT BY SECTOR. WAGE AND SALARY EMPLOYMENT
KREMMLING RESOURCE AREA**

	1975	1980	1986	PERCENT OF TOTAL		
				1975	1980	1986
GRAND COUNTY						
TOTAL	3,052	4,517	5,949	100	100	100
AGRICULTURE SERV.	23	29	36	1	1	1
MINING	18	W	W	1	N/A	N/A
CONSTRUCTION	728	543	432	24	12	7
MANUFACTURING	168	218	242	6	5	4
TRANSPORT & PU	106	114	139	3	3	2
WHLSL TRADE	17	25	31	1	1	1
RETAIL TRADE	596	1,086	1,351	20	24	23
FINANCE,INSUR, RE	183	472	791	6	10	13
SERVICES	794	1,423	2,111	26	32	35
GOVERNMENT	419	605	815	14	13	14

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

TABLE O-5. EMPLOYMENT BY SECTOR. WAGE AND SALARY EMPLOYMENT
KREMMLING RESOURCE AREA

JACKSON COUNTY				PERCENT OF TOTAL		
	1975	1980	1986	1975	1980	1986
TOTAL	638	764	710	100	100	100
AGRICULTURE SERV.	19	0	0	3	0	0
MINING	42	130	22	7	17	3
CONSTRUCTION	20	31	47	3	4	7
MANUFACTURING	123	106	126	19	14	18
TRANSPORT & PU	39	31	44	6	4	6
WHLSL TRADE	0	0	0	0	0	0
RETAIL TRADE	122	177	172	19	23	24
FINANCE,INSUR, RE	25	25	23	4	3	3
SERVICES	89	84	88	14	11	12
GOVERNMENT	145	161	162	23	21	23

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

TABLE O-6. EMPLOYMENT BY SECTOR. WAGE AND SALARY EMPLOYMENT
KREMMLING RESOURCE AREA

TOTAL RESOURCE AREA				PERCENT OF TOTAL		
	1975	1980	1986	1975	1980	1986
TOTAL	3,690	5,281	6,659	100	100	100
AGRICULTURE SERV.	55	0	0	1	0	0
MINING	60	0	0	2	0	0
CONSTRUCTION	748	574	479	20	11	7
MANUFACTURING	291	324	368	8	6	6
TRANSPORT & PU	145	145	183	4	3	3
WHLSL TRADE	0	0	0	0	0	0
RETAIL TRADE	718	1,263	1,523	19	24	23
FINANCE,INSUR, RE	208	497	814	6	9	12
SERVICES	883	1,507	2,199	24	29	33
GOVERNMENT	564	766	977	15	15	15

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

TABLE O-7. EMPLOYMENT BY SECTOR. WAGE AND SALARY EMPLOYMENT
KREMMLING RESOURCE AREA

	THOUSAND DOLLARS			PERCENT OF TOTAL		
	1975	1980	1986	1975	1980	1986
TOTAL	1,204,940	1,567,530	1,875,300	100	100	100
AGRICULTURE SERV.	7,733	12,629	18,176	1	1	1
MINING	21,877	41,283	38,431	2	3	2
CONSTRUCTION	70,551	102,176	117,056	6	7	6
MANUFACTURING	140,510	185,022	194,579	12	12	10
TRANSPORT & PU	64,361	84,305	97,391	5	5	5
WHLSTL TRADE	61,499	80,096	82,799	5	5	4
RETAIL TRADE	211,152	273,584	318,250	18	17	17
FINANCE,INSUR, RE	90,325	136,306	191,443	7	9	10
SERVICES	263,730	359,226	502,243	22	23	27
GOVERNMENT	273,199	292,903	314,934	23	19	17

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

TABLE O-8. EARNINGS BY SECTOR--KREMMLING RESOURCE AREA

	THOUSAND DOLLARS			PERCENT OF TOTAL		
	1975	1980	1986	1975	1980	1986
TOTAL	32,803	51,595	78,671	100	100	100
AGRICULTURE SERV.	190	296	501	1	1	1
MINING	698	352	281	2	1	0
CONSTRUCTION	13,482	12,490	10,949	41	24	14
MANUFACTURING	1,474	2,661	3,902	4	5	5
TRANSPORT & PU	1,590	2,064	3,173	5	4	4
WHLSTL TRADE	202	405	669	1	1	1
RETAIL TRADE	4,071	8,152	11,072	12	16	14
FINANCE,INSUR, RE	1,001	2,985	6,793	3	6	9
SERVICES	6,833	14,923	26,272	21	29	33
GOVERNMENT	3,262	7,267	15,059	10	14	19

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

TABLE O-9. EARNINGS BY SECTOR--KREMMLING RESOURCE AREA

	THOUSAND DOLLARS			PERCENT OF TOTAL		
	1975	1980	1986	1975	1980	1986
JACKSON COUNTY	1975	1980	1986	1975	1980	1986
TOTAL	5,642	11,051	10,511	100	100	100
AGRICULTURE SERV.	212	W	W	4	N/A	N/A
MINING	911	3,900	726	16	35	7
CONSTRUCTION	286	437	798	5	4	8
MANUFACTURING	1,373	2,189	2,746	24	20	26
TRANSPORT & PU	486	502	739	9	5	7
WHLSL TRADE	112	W	W	2	N/A	N/A
RETAIL TRADE	682	1,136	1,586	12	10	15
FINANCE,INSUR, RE	197	321	347	3	3	3
SERVICES	407	546	566	7	5	5
GOVERNMENT	1,051	1,834	2,679	19	17	25

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

TABLE O-10. EARNINGS BY SECTOR--KREMMLING RESOURCE AREA

	THOUSAND DOLLARS			PERCENT OF TOTAL		
	1975	1980	1986	1975	1980	1986
TOTAL RESOURCE AREA	1975	1980	1986	1975	1980	1986
TOTAL	38,445	62,646	89,182	100	100	100
AGRICULTURE SERV.	W	W	713	N/A	N/A	1
MINING	1,609	4,252	1,007	4	7	1
CONSTRUCTION	13,768	12,927	11,747	36	21	13
MANUFACTURING	2,847	4,850	6,648	7	8	7
TRANSPORT & PU	2,076	2,566	3,912	5	4	4
WHLSL TRADE	W	W	781	N/A	N/A	1
RETAIL TRADE	4,753	9,288	12,658	12	15	14
FINANCE,INSUR, RE	1,198	3,306	7,140	3	5	8
SERVICES	7,240	15,469	26,838	19	25	30
GOVERNMENT	4,313	9,101	17,738	11	15	20

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

APPENDIX O

TABLE O-11. EARNINGS BY SECTOR--KREMMLING RESOURCE AREA

	THOUSAND DOLLARS			PERCENT OF TOTAL		
	1975	1980	1986	1975	1980	1986
COLORADO						
TOTAL	12,119,900	23,604,800	37,138,400	100	100	100
AGRICULTURE						
SERV.	58,226	120,113	191,827	0	1	1
MINING	473,960	1,241,990	1,441,770	4	5	4
CONSTRUCTION	938,980	2,064,920	2,802,940	8	9	8
MANUFACTURING	1,845,720	3,757,330	5,696,720	15	16	15
TRANSPORT & PU	961,474	1,988,090	3,085,000	8	8	8
WHLSL TRADE	845,397	1,680,500	2,232,840	7	7	6
RETAIL TRADE	1,447,880	2,578,470	3,854,020	12	11	10
FINANCE,INSUR, RE	701,941	1492,,420	2,775,180	6	6	7
SERVICES	2,170,080	4,509,460	8,391,980	18	19	23
GOVERNMENT	2,676,220	4,171,560	6,666,080	22	18	18

Source: Bureau of Economic Analysis

W: Withheld to avoid disclosing confidential information

Note: Percent of total detail may not add to 100 percent because of rounding

N/A: Not Available

TABLE O-12. LOCAL GOVERNMENT FINANCIAL DATA 1986--KREMMLING RESOURCE AREA

	COUNTIES			COMMUNITIES					
	GRAND	JACKSON	FRASER	WINTER PARK	GRANBY	GRAND LAKE	HOT SULPHUR SPRINGS	KREMMLING	WALDEN
PER CAPITA ASSESSED VALUATION	18000	14360	6350	32050	4250	12850	3130	3440	2790
TOTAL MILL LEVY	14.53	10.5	9.96	4.08	9.31	9	3.13	7.8	19
PER CAPITA RETAIL SALES	11710	8820	17070	39690	16100	16470	2520	9500	9490
TOTAL SALES TAX RATE PERCENT	4	6	8	8	8	8	8	8	6
BUDGET GENERAL ACTIVITIES 000\$									
REVENUE	7444	1748	606	1611	738	482	81	537	304
OPERATING EXPENSES	6335	1451	329	1086	539	429	35	352	269
GENERAL OPERATING									
INDEBTEDNESS	0	0	0	0	0	0	40	180	0
OTHER INDEBTEDNESS	370	0	114	3928	112	221	0	0	0

Source: Local Government Financial Data Colorado Department of Local Affairs

TABLE O-13. CURRENT EMPLOYMENT IN MOFFAT COUNTY
LITTLE SNAKE RESOURCE AREA

	Employment			Percent of Total		
	1980a	1982a	1985b	1980	1982	1985*
Agriculture	487	498	521	6	8	9
Mining	1,076	600	614	16	10	10
Construction	559	413	368	9	7	6
Manufacturing	278	135	114	4	2	2
Trans., Comm., Utilities	618	(D)	488	10	---	8
Trade	1,363	1,036	1,153	21	17	21
Finance, Inc., Real Estate	180	191	333	3	3	6
Services	519	661	600	8	11	11
Government	666	944	812	10	16	14
Unclassified	722	1,553	703	11	26	13
Total	6,472	6,031*	5,706	100*	100	100
Total Personal Income \$(000)	146,063	157,058	142,328			
Percentage Unemployment	8.3	8.4*	10.9			

(D) Not shown to avoid disclosure of confidential data.

* Does not include confidential data (D)

a From the Draft EIS for the Little Snake RMP

b BLM Estimate

TABLE O-14. CURRENT EMPLOYMENT IN ROUTT COUNTY
LITTLE SNAKE RESOURCE AREA

	Employment			Percent of Total		
	1980a	1982a	1985b	1980	1982	1985*
Agriculture	471	473	411	6	6	5
Mining	608	801	625	8	9	7
Construction	1,060	1,023	1,207	14	14	12
Manufacturing	70	100	117	1	1	1
Trans., Comm., Utilities	440	520	581	6	6	7
Trade	1,695	1,381	1,792	22	16	21
Finance, Inc., Real Estate	653	576	674	9	7	8
Services	1,130	1,442	2,007	14	17	23
Government	600	885	934	8	10	10
Unclassified	883	1,224	515	12	14	6
Total	7,610	8,629	8,687	100	100	100
Total Personal Income \$(000)	189,146	192,806	203,359			
Percentage Unemployment	5.8	5.9	8.2			

* Percent is rounded

a From the Draft EIS for the Little Snake RMP

b BLM Estimate

APPENDIX O

TABLE O-15. EMPLOYMENT AND PERSONAL INCOME FOR MINERAL-RELATED ACTIVITY
LITTLE SNAKE RESOURCE AREA

Activity	Activity Employment		Total Two County Labor Force		Percent of Total**		Total Wages		Total Personal Income LSRA All Categories		Percent of Total**	
	1982	1985	1982	1985	1982	1985	1982	1985	1982	1985	1982	1985
Coal	1,401	1,290	14,660	15,584	9.6	8.2	43,146,597	52,884,000	324,815,000	345,558,700	13.2	15.3
Oil & Gas	155	140	14,660	15,584	1.1	.9	4,119,280	3,858,790	324,815,000	345,568,700	1.3	1.1
Coal Power Plants	565	560	14,660	15,584	3.8	3.5	12,182,530	13,428,820	324,815,000	345,568,700	3.8	3.8
Total	2,121	1,990	14,660	15,584	14.5	12.6	59,448,407	70,171,610	324,815,000	345,568,700	18.3	20.2

* Bureau of Economic Analysis, Regional Economic Information System, April

1984. BEA Employment and Personal Income.

U.S. Department of Commerce, Washington, D.C.

**Percentages rounded to nearest tenth.

TABLE O-16. AGRICULTURE EARNINGS (IN THOUSANDS)
LITTLE SNAKE RESOURCE AREA

County	Livestock Products		Crops		Total	
	1982	1984	1982	1984	1982	1984
Moffat	\$8,948	\$10,261	\$3,194	\$3,464	\$12,142	\$13,725
Routt	\$8,776	\$12,241	\$4,195	\$3,673	\$12,971	\$15,914

Source: Bureau of Economic Analysis, Regional Economic Information System, 1983/4. BEA Farm Income and Expenditures. U.S. Department of Commerce, Washington, D.C. 1984, data is the most recent at time of analysis.

TABLE O-17. POPULATION IN MOFFAT AND ROUTT COUNTIES
LITTLE SNAKE RESOURCE AREA

County	1980	1982	1986*
Moffat County	13,133	14,500	10,840
Craig	8,133	10,000	8,230
Dinosaur	313	1,000	910
Unincorporated	4,687	3,500	1,700
Routt County	13,404	14,700	14,711
Hayden	1,720	1,904	1,280
Oak Creek	929	1,010	850
Steamboat Springs	5,098	5,627	6,031
Yampa	472	505	430
Unincorporated	5,185	5,654	6,120

Source: Demographic Section, Colorado Division of Local Government, March, 1985.

* BLM Year End Estimate, 1986

TABLE O-18. HOUSING UNITS 1985
LITTLE SNAKE RESOURCE AREA

County	Occupied	Vacant
Moffat County		
Craig	897	390
Dinosaur	100	33
Routt County		
Hayden	559	51
Oak Creek	365	153
Steamboat Springs	2,111	1,320
Yampa	158	50

Source: U.S. Department of Commerce, 1980 Census of Population and Housing & 1985 BLM estimate.

Note: Data not available for Maybell, Milner, and Phippsburg.

TABLE O-19. LOCAL MUNICIPAL GOVERNMENT FINANCIAL DATA
LITTLE SNAKE RESOURCE AREA

	Craig	Dinosaur	Hayden	Oak Creek	Steamboat Springs	Yampa
Assessed Valuation (1985)						
Total (000)	\$40,168	\$ 1,141	\$4,864	\$2,100	\$83,910	\$1,335
Per Capita	\$4,880	\$ 1,253	\$3,800	\$2,470	\$13,913	\$3,104
Mill Levy	14.0	10.328	26.834	19.887	3.658	19.830
Sales Taxes (FY 85)						
Total (000)	\$954	\$52	\$177	\$66	\$4,307	\$0
Per Capita	\$116	\$57	\$138	\$78	\$714	\$0
Sales Tax Rate (%) (7/1/83)	2.0	2.0	2.0	3.0	7.5	0
Bonded Debt (12/31/82) (000)						
General Obligation	\$0	\$0	\$09	\$170	\$830	\$0
Revenue	\$0	\$0	\$0	\$0	\$1,185	\$0
Remaining Bonding Capacity (000)	*	\$141	\$486	\$210	*	\$0

Sources: Colorado Division of Property Taxation, Fifteenth Annual Report, Colorado Division of Local Government, 1985 Local Government Financial Compendium, Colorado Department of Revenue, Annual Report 1983.

Percents are: Community: 10% (3% of actual valuation which, at 30% assessment rate, equals 10% of assessed valuation) School Districts: 20%

*Two measures are used: bonding capacity and capital requirements. Bonding capacity is a limit established by the state legislature on the dollar value of general obligation bonds a local jurisdiction may have outstanding. It is based on assessed valuation, amounting to approximately 10 percent for communities and 20 percent for school districts. Home rule cities are not subject to this limit but, since voter resistance increases as more bonds are issued, a similar limit may well apply. General obligation bonds outstanding as of 12/31/84 (the latest published data) were subtracted from gross bonding capacity because the tracts are not included and because of the difficulty of projecting the assessed valuation of oil shale properties.

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**TABLE O-20. LOCAL COUNTY GOVERNMENT FINANCIAL DATA
LITTLE SNAKE RESOURCE AREA**

	Moffat County	Routt County
Assessed Valuation (1985)		
Total (000)10	\$388,132	\$211,096
Per Capita	\$35,805	\$14,349
Mill Levy	13.63	18.89
Sales Taxes (FY 85)		
Total (000)	\$ 556	
Sales Tax Rate (%)1/	2.0	0
(12/31/85)		
Bonded Debt (12/31/85)		
(000)		
General Obligation	\$ 0	\$ 0
Revenue	\$ 0	\$ 0
Remaining Bonding Capacity		
Where Limited (000)	\$38,813	\$21,109

Sources: Colorado Division of Property Taxation, Fifteenth Annual Report. Colorado Division of Local Government, 1985 Local Government Financial Compendium. Colorado Department of Revenue, Annual Report 1985.

1/ County rate does not include state sales tax rate.

**TABLE O-21. LOCAL SCHOOL DISTRICT FINANCIAL DATA
LITTLE SNAKE RESOURCE AREA**

	South Routt School District	Hayden District	Steamboat Springs School District	Moffat County School District
Assessed Valuation (1985)				
Total (000)	\$33,796	\$58,909	\$117,325	\$388,132
Per Capita	\$11,265	\$18,502	\$ 14,135	\$ 35,805
Mill Levy (1985)	57.410	33.570	48.610	24.16
Sales Tax	N/A	N/A	N/A	
Sales Tax Rate	N/A	N/A	N/A	
Bonded Debt (000)				
General Obligation	\$520	\$328	\$586	\$ 737
Revenue	0			
Remaining Bonding Capacity (000) 1/	\$ 6,655	\$11,716	\$23,347	\$ 77,479

Sources: Colorado Division of Property Taxation, Eleventh Annual Report. Colorado Division of Local Government, 1985 Local Government Financial Compendium. Colorado Department of Revenue, Annual Report 1985.

1/ Percentage of assessed valuation, less general obligation bonded debt. Percents are: Community: 10% (3% of actual valuation which, at 30% assessment rate, equals 10% of assessed valuation) School Districts: 20%.

TABLE O-22. FEDERAL, STATE, AND LOCAL MINERAL REVENUE
GENERATED FROM THE RESOURCE AREA IN 1985
LITTLE SNAKE RESOURCE AREA

County	Generated	50% Returned to State	County Share
Moffat	\$10,838,3151	\$5,419,157	\$397,023
Routt	\$14,159,398	\$7,074,699	\$416,550

TABLE O-23. POPULATION, PER CAPITA INCOME, AND EMPLOYMENT
BY COUNTY--SAN JUAN/SAN MIGUEL PLANNING AREA

County	Population ¹		Per Capita Income ²		Employment ³	
	1980	1986	1980	1986	1980	1986
Archuleta	3,734	5,365	12,281	9,566	1,125	2,463
Dolores	1,664	1,562	12,363	13,194	560	772
La Plata	27,437	30,171	12,001	12,869	13,736	15,113
Montezuma	16,669	17,412	11,383	11,471	6,301	8,214
Montrose	24,543	25,240	10,482	10,681	11,649	12,102
San Juan	863	784	11,350	11,940	488	636
San Miguel	3,201	3,791	9,425	9,909	1,767	2,170
Total	78,111	84,325	11,300	11,579	35,626	41,470
Colorado	2,908,563	3,266,149	13,968	15,233	1,413,999	1,570,003

Source: Bureau of Economic Analysis.

¹ Mid-year population projection is reported in this table.

² Per Capita Income is reported in constant 1986 dollars.

³ Employment is by place of work.

TABLE O-24. 1986 EMPLOYMENT BY SECTOR FOR COUNTIES
SAN JUAN/SAN MIGUEL PLANNING AREA

	Archuleta ²	Dolores ²	La Plata	Montezuma	Montrose	San Juan ²	San Miguel
Farm	216	204	869	726	1,259	0	135
Ag. Services	31	--	248	141	205	0	12
Mining	46	--	141	307	415	-	12
Construction	--	33	1,502	879	769	-	257
Manufacturing	46	--	646	438	829	10	59
Transportation & Public Utilities	48	16	610	336	1,001	-	28
Wholesale	--	31	327	203	284	-	0
Retail	531	115	3,795	1,558	1,743	-	465
Finance, Insurance & Real Estate	322	--	1,410	430	997	-	322
Services	--	47	5,662	1,613	2,690	53	570
Government	316	248	2,578	1,571	1,910	69	307
Total ³	2,759	734	17,788	8,202	12,102	504	2,170

Source: Bureau of Economic Analysis

¹ The information in this table is employment by place of residence. This differs from employment reported in table 3-54 which is employment by place of work.

² Information is missing from some sectors of small counties so as not to divulge proprietary data.

³ Totals as reported by Bureau of Economic Analysis.

TABLE O-25. ESTIMATED IMPACT OF 1987 TOURISM ON COUNTIES
SAN JUAN/SAN MIGUEL PLANNING AREA¹

County	Archuleta	Dolores	La Plata	Montezuma	Montrose	San Juan	San Miguel
Expenditures	27.955	966	118.613	31.144	19.264	5.242	4.807
Payroll	6.012	155	25.837	6.769	4.154	1.125	1.058
State Tax	1.007	014	4.302	1.136	685	186	168
Local Tax	231	005	2.550	467	246	076	041
Employment ²	754	15	3,237	844	511	142	131

Source: The Economic Impact of Travel on Colorado Counties 1984, Colorado Tourism Board.
U.S. Travel Data Center Washington, D.C.

¹ Figures are 1984 projections given in millions of 1986 dollars.

² Employment figures are 1984 projections of the number of persons employed.

TABLE O-26. 1988 HUNTING AND FISHING EXPENDITURES IN THOUSANDS
OF 1988 DOLLARS--SAN JUAN/SAN MIGUEL PLANNING AREA¹

County	Archuleta	Dolores	La Plata	Montezuma	Montrose	San Juan	San Miguel
DEER							
Resident ²	412.7	103.4	723.2	603.7	868.7	89.5	271.8
Nonresident	1228.7	318.0	1231.9	1220.5	1564.4	133.7	684.5
ELK							
Resident	664.1	126.7	889.6	513.5	560.5	99.6	266.4
Nonresident	1615.7	194.6	1318.5	595.2	692.5	126.2	373.2
OTHER BIG GAME							
Resident	31.6	5.4	47.7	26.1	33.1	3.4	9.7
Nonresident	3.2	.5	3.0	2.0	2.3	.3	.7
SMALL GAME							
Resident	128.3	9.4	194.1	530.3	1022.0	5.3	497.8
FISHING							
Resident	1349.2	467.7	1919.1	689.3	925.7	300.3	492.6
Nonresident	688.6	533.4	2646.1	895.6	391.8	314.9	830.7

Source: Colorado Division of Wildlife Economic Impact Model

¹ The calculation of wildlife economic impacts are reported by The Colorado Department of Wildlife to be preliminary and of uncertain accuracy.

² Colorado Resident

TABLE O-27. YEAR 2010--KREMMLING RESOURCE AREA

ESA	Populations	Impact	Percent as Impact
Scenario 1			
Current Trends and Conditions	11,285		
Development	11,307	22	less than 1 percent
Scenario 2			
Current Trends and Conditions	11,285		
Development	11,578	293	2.6 percent

TABLE O-28. YEAR 2009--LITTLE SNAKE RESOURCE AREA

COUNTY	POPULATION	IMPACT	PERCENT AS IMPACT
ROUTT			
Current Trends and Conditions	19,845		
Development	19,921	76	1%
MOFFAT			
Current Trend and Conditions	15,921		
Development	16,214	293	1%

TABLE O-29. YEAR 2010. PRESENT MANAGEMENT
SAN JUAN/SAN MIGUEL PLANNING AREA

ESA	POPULATION	IMPACT	PERCENT AS IMPACT
Scenario 1			
Current Trends and Conditions	84,325		
Development	84,377	52	less than 1 percent
Scenario 2			
Current Trends and Conditions	84,325		
Development	84,334	1,009	1 percent

APPENDIX O

TABLE O-30. YEAR 2010. STANDARD TERMS AND CONDITIONS
SAN JUAN/SAN MIGUEL PLANNING AREA

ESA	POPULATION	IMPACT	PERCENT AS IMPACT
Scenario 1			
Current Trends and Conditions	84,325		
Development	84,366	42	Less than 1 percent
Scenario 2			
Current Trends and Conditions	84,325		
Development	85,323	998	1 percent

TABLE O-31. YEAR 2010. PROPOSED ACTION
SAN JUAN/SAN MIGUEL PLANNING AREA

ESA	POPULATION	IMPACT	PERCENT AS IMPACT
Scenario 1			
Current Trends and Conditions	84,325		
Development	85,377	52	less than 1 percent
Scenario 2			
Current Trends and Conditions	84,325		
Development	85,287	1,009	1 percent

APPENDIX P

SPECIAL STATUS SPECIES INFORMATION





UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE ENHANCEMENT
Colorado State Office
730 Simms Street, Suite 290
Golden, CO 80401
FTS 776-2675
COMM (303) 236-2675



IN REPLY REFER TO:

FWE/CO:BLM:Co Oil & Gas Leasing
Mail Stop 65412 Grand Junction

August 21, 1990

Memorandum

To: Team Leader, Combined Oil and Gas Plan Amendment/EIS, Bureau of
Land Management, Grand Junction, Colorado

From: ~~For~~ Colorado State Supervisor, Fish and Wildlife Enhancement, Fish and
Wildlife Service, Golden, Colorado

Subject: Comments on Colorado Oil and Gas Leasing Draft EIS

We offer the following comments on your Combined Oil and Gas Plan Amendment/EIS which covers the Glenwood Springs, Kremmling, Little Snake, Northeast, and San Juan/San Miguel Resource Areas. First, we have published a new candidate plant list February 21, 1990, in the Federal Register (55 FR 6184). Since we sent you a previous species list on this project on June 16, 1989, we are therefore sending you an updated plant candidate list.

Common Name	Scientific Name
<u>Glenwood Springs</u>	
Wetherill milkvetch	<u>Astragalus wetherilli</u>
Parachute beardtongue	<u>Penstemon debilis</u>
Harrington beardtongue	<u>Penstemon harringtonii</u>
DeBeque phacelia	<u>Phacelia submutica</u>
<u>Kremmling</u>	
Harrington beardtongue	<u>Penstemon harringtonii</u>
<u>Little Snake</u>	
Hamilton milkvetch	<u>Astragalus hamiltonii</u>
Wetherill milkvetch	<u>Astragalus wetherilli</u>
Ownbeyi thistle	<u>Cirsium ownbeyi</u>
Gibbens beardtongue	<u>Penstemon gibbensii</u>

Common Name	Scientific Name
<u>Northeast</u>	
none	
<u>San Juan/San Miguel</u>	
Mancos columbine	<u>Aquilegia miciantha</u>
Cronquist milkvetch	<u>Astragalus cronquistii</u>
Schmoll milkvetch	<u>Astragalus schmollii</u>
Mesa Verde stickseed	<u>Hackelia gracilentia</u>
Pagosa skyrockets	<u>Ipomopsis polyantha</u> var. <u>polyantha</u>
Frosty bladderpod	<u>Lesquerella pruinosa</u>

Also, Osterhout milkvetch (Astragalus osterhoutii) and Penland Beardtongue (Penstemon penlandii) are federally listed as endangered, whereas they appear on Table 3-2 on page 3-8 as federally threatened.

No Surface Occupancy Stipulations (NSO) are listed in your Appendix E for various resources/values in the different resource areas including candidate, threatened, and endangered species. With a forty-acre minimum, NSO's are most effective for protecting large populations of high concentration. In this regard, we recommend NSO's for the Osterhout milkvetch and Penland beardtongue in the Kremmling Resource Area, and the Gibbens beardtongue in the Little Snake Resource Area. Maps showing the recommended NSO's are attached. These species have been adequately surveyed and known populations of high concentration delineated.

Additionally, the June 16, 1989, memorandum discussed the importance of the Section 7 consultation process. However, we do not find any attention to the Section 7 process anywhere in the EIS. This should be corrected.

The Fish and Wildlife Service, with the cooperation of the BLM and Colorado Division of Wildlife, is currently evaluating black-footed ferret reintroduction sites in Colorado. At the present time, this is ongoing in the Little Snake and White River Resource Areas. Eventually, however, all BLM resource areas in Colorado will receive similar consideration. We therefore recommend changes to the EIS to recognize the implications the ferret reintroduction process may have on the management of prairie dogs on BLM lands.

The Fish and Wildlife Service is preparing guidelines for oil and gas activities in black-footed ferret recovery areas. A copy of the draft guidelines has been provided to Mr. Lee Upham and Mr. Bob Kline. The draft

EIS should incorporate reference to these guidelines where appropriate with a commitment to adopt specific mitigation techniques where necessary.

The Fish and Wildlife Service believes that major causes for the decline of the Colorado squawfish, humpback chub, bonytail chub, and the recently proposed razorback sucker, include the effect of impoundments and water depletion from the Colorado River and its tributaries such as the San Juan. Since oil and gas drilling involves a depletion of water, we believe that any action made possible by your Oil and Gas Leasing EIS that causes a depletion of water from the upper Colorado River basin should prompt a "may effect" finding for the listed and proposed fishes and necessitate consultation and conferencing under the Endangered species Act.

As we have previously discussed, the most efficient way to handle the many small depletions from individual wells would be to make an estimate of total depletion for the four resource areas in the upper Colorado River basin covered in the EIS. This estimate could be based on the Assumptions for the Potential of Development already presented in Appendix B.

This way the impacts to the endangered Colorado River fishes could be covered by one biological assessment and one biological opinion at the leasing stage, rather than many such documents for every oil and gas well authorized through the subsequent Application for Permit to Drill process.

Specific Comments

FWS Memo of 6/16/89

Page 2-9: Based on this table only, there appears to be only minor differences between the three plans. It is not clear what advantage the proposed amendment has to resource protection or the administration of oil and gas leasing.

Page 3-21: Threatened and endangered species. This section should receive consistent treatment for each planning area. For example, there should be a table for each resource area, similar to Table 3-90 prepared for the Northeast Planning Area. Each planning area should include those lists of species provided by the FWS to the BLM on June 16, 1989. The razorback sucker was proposed for Federal listing on May 22, 1990, and is therefore no longer a candidate species.

Page 3-26, left-hand column: The process of identifying potential black-footed ferret reintroduction sites will occur throughout all of Colorado. Consequently, we believe this paragraph should recognize that evaluation of candidate sites will eventually occur in all of the planning areas discussed in the EIS, not only northwest Colorado. Prairie dog abundance may be more than adequate to support black-footed ferrets in many other Resource areas.

Page 4-1, right-hand column: This paragraph should recognize that informal and/or formal consultation may be required under Section 7 of the

Endangered Species Act. This consultation may in some cases be appropriate at the learning rather than the operational stage.

Page 4-5, right-hand column: What is "...the protection for T&E species." We believe it is premature to say that significant impacts to threatened and endangered species will not occur. Based on current inventories, there are 62,000 acres of prairie dog habitat in the Little Snake Resource Area. We are not aware of similar inventories in the other resource areas but suspect significant prairie dog acres in the San Juan/San Miguel Planning Area also. Consequently, we believe this section should recognize the guidelines for Oil and Gas Activities in Prairie Dog Ecosystems Managed for Black-footed Ferret Recovery being prepared by the Fish and Wildlife Service. It is not clear to us how the application of appropriate mitigation listed in Appendix D will preclude significant impacts. The key language in Appendix D, page D-7, appears to be "...effectively mitigate...to the degree that existing development rights are not unduly hindered or precluded."

Page 4-24, left-hand column: It is true that threatened and endangered species are covered by laws and regulations. However, it is possible for significant impacts to result from some activities. For example, while Section 7 of the Endangered Species Act requires a consultation process, impacts below the jeopardy-causing threshold may occur. We believe it is inappropriate to imply that the existence of laws will prevent significant impacts.

Page B-2: According to this table, the Little Snake Resource Area could realize the greatest surface disturbance of all the planning areas evaluated. Development in prairie dog towns prior to their evaluation for black-footed ferret recovery could compromise potential reintroduction proposals.

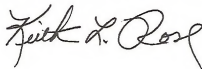
Page E-1, left-hand column: It is unclear what minor inventories or short-term special studies include. We can imagine a lessee arguing against mapping prairie dog towns and/or completing black-footed ferret searches.

Page D-7: Threatened and endangered species. We believe this section should restate the possibility of the consultation that could be required under section 7 of the ESA, and the guidelines for oil and gas activities in ferret recovery areas be prepared by the FWS.

Page E-2: No surface occupancy. Until black-footed ferret recovery potential has been evaluated in each planning area, and reintroduction decision documents are in place, we believe all prairie dog towns in each planning area should be designated NSO. According to the peregrine falcon recovery plan for the Rocky Mountain Southwest Populations, recovery task number 1221 asks that permanent disturbances be prohibited within 1 mile of falcon nesting cliffs. We believe the NSO stipulation should adopt this recommendation.

Appendix L: A threatened and endangered species animal list needs to be added here. There should be a similar appendix for the Kremmling and Northeast Planning areas.

If the Service can be of further assistance, please contact John Anderson (plants) or Bob Leachman (animals) of the Grand Junction office at (303) 243-2778 or FTS 322-0351.

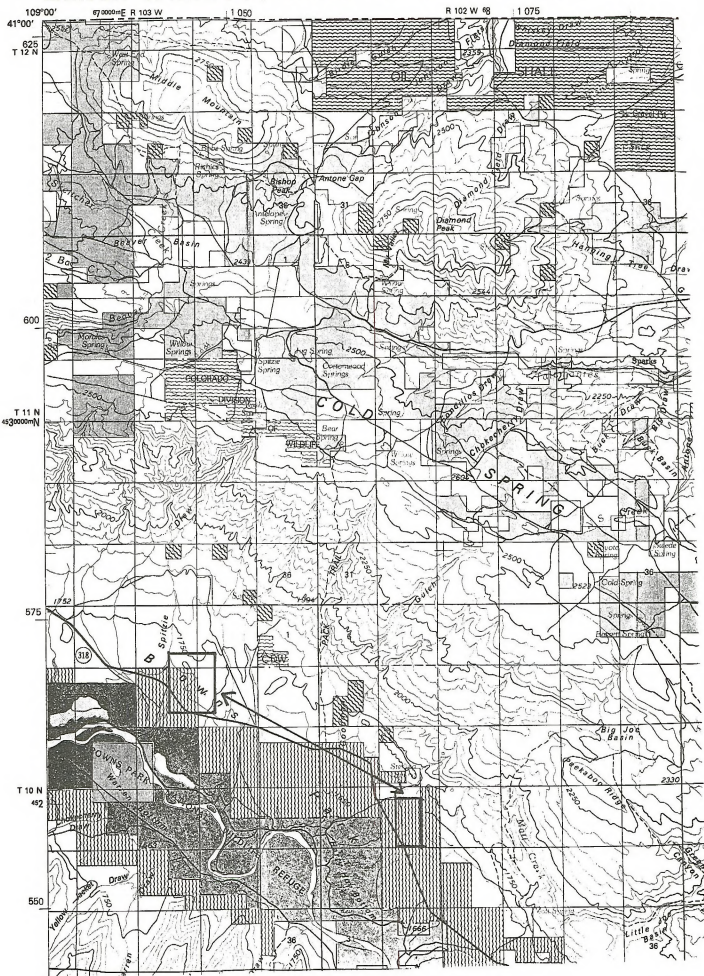
A handwritten signature in black ink, appearing to read "Keith L. Rose". The signature is fluid and cursive, with the first name "Keith" being more prominent and the last name "Rose" following in a similar style. There is a small "L." between the first and last names.

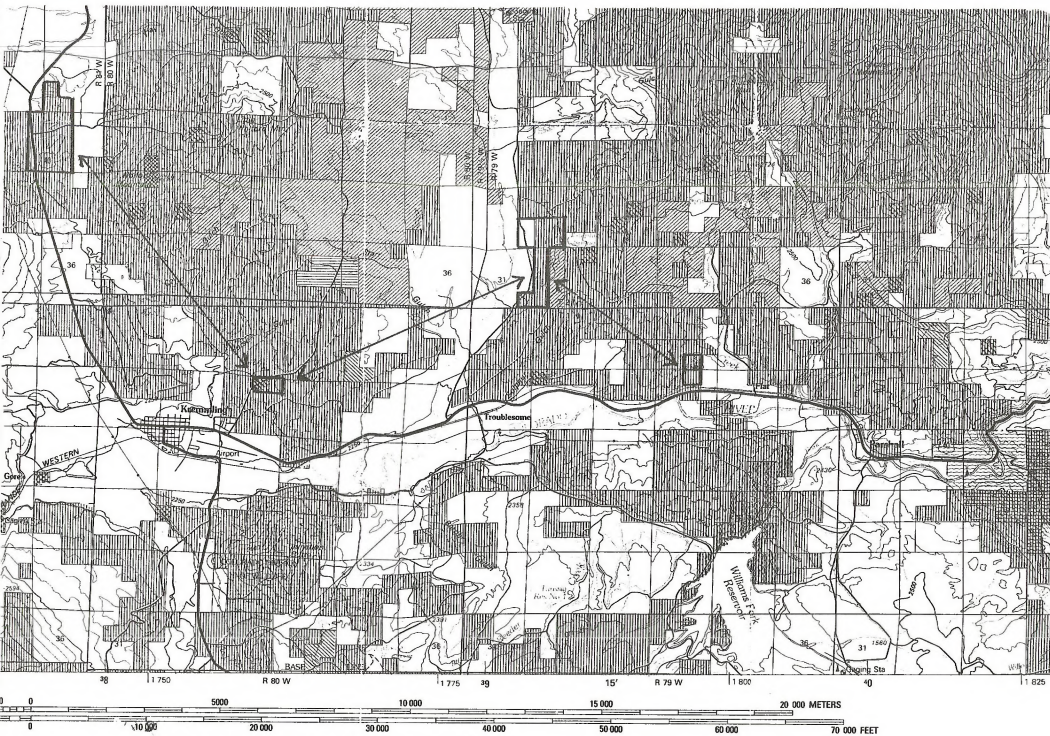
attachments

cc: FWS/FWE, Salt Lake City
FWS/FWE, Grand Junction

CANYON OF LODORE, COLORADO

MOFFAT COUNTY



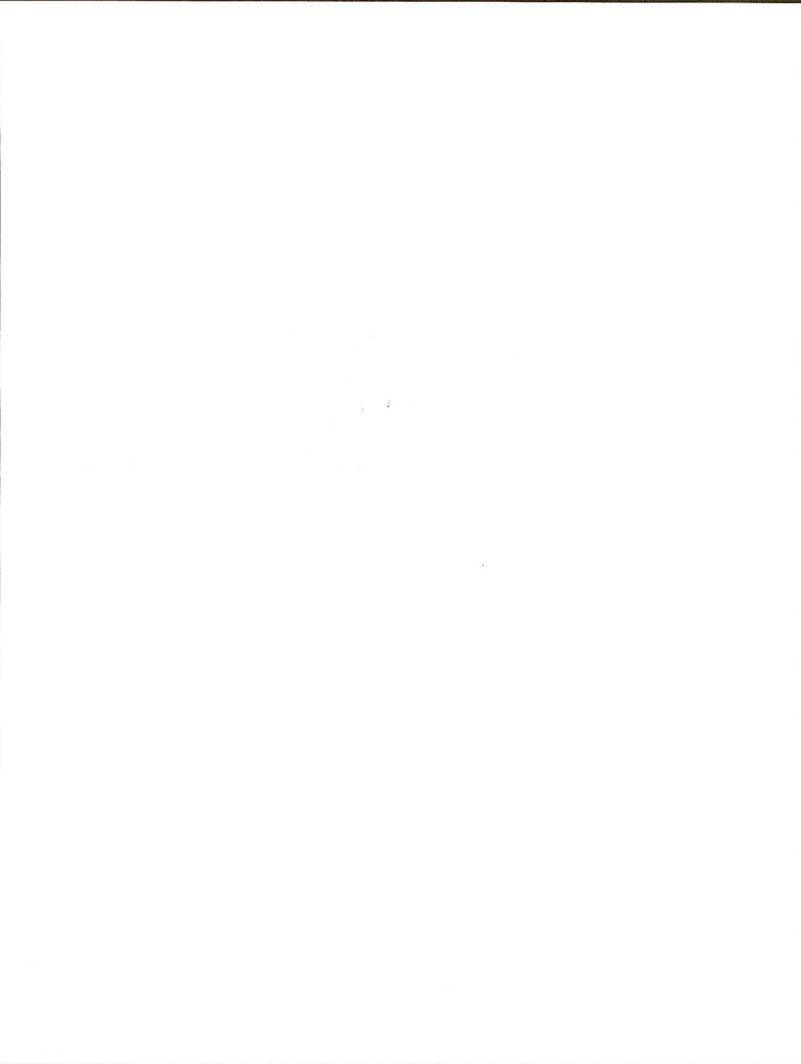


Osterhout milkvetch (*Astragalus osterhoutii*)
 Penland beardtongue (*Penstemon penlandii*)



APPENDIX 9

COMMENT LETTERS



OIL & GAS ALERT

PUBLIC COMMENT NEEDED!!!

SIERRA CLUB

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Rocky Mountain Chapter
777 Grant Street, Suite 604 Denver, Colorado 80202 303-541-5819

Due to pressure from the environmental community to improve its oil and gas leasing program, the Bureau of Land Management (BLM) has released a draft environmental impact statement (EIS) covering oil and gas development in five of its eleven Colorado resource areas: Glenwood Springs, Kremmling, Little Snake, Northeast, and San Juan/San Miguel.

The EIS fails to protect a great number of ecologically important areas from oil and gas development. Basset canyons, important river corridors, critical wildlife habitat, and endangered plant species are at risk. Your help is needed to change the final EIS and prevent the destruction of these areas.

PLEASE WRITE THE BLM NOW! Make these points in your letter:

1. Tell the BLM that the best way to protect critical resources on their lands is to close an area to oil and gas development, not to issue leases with stipulations. The BLM has discretionary no-lease authority to close areas to oil and gas leasing, but has failed to prescribe its use in the EIS. Out of 3.2 million acres of BLM land the EIS covers, only 28,000 acres are closed to leasing under the no-lease authority! Demand that the following areas in the five resource areas be given no-lease status in order to protect their values:
 1. Areas of Critical Environmental Concern (ACECs);
 2. all wetland, riparian, and aquatic areas;
 3. critical winter range, calving/feeding areas, and migration corridors;
 4. habitat for endangered species;
 5. cultural sites; and
 6. developed and primitive recreation areas.

These specific areas are threatened with development and should be off-limits to oil and gas activity:

1. Vermilion Basin which includes the Irish Canyon ACEC and Lookout Mountain ACEC, a spectacular 88,000 acre roadless area in the Little Snake Resource Area that currently has no protection;
 2. Sunlight Peak, a primitive recreation area in the Glenwood Springs Resource Area; and
 3. Anasazi ACEC in the San Juan/San Miguel Resource Area, where numerous archaeological sites are threatened by oil and gas activity and attendant vehicle access to ruin areas.
8. Tell the BLM that stipulations, and in particular the no-surface occupancy (NSO) stipulation, are not adequate to protect important resources. The BLM's current practice of waiving stipulations, thus rendering the protection they are suppose to protect totally ineffective. The BLM's single areas are designated with a NSO stipulation in the EIS; it is economically feasible for companies to directionally drill into an area from only a 1/4 mile away. NSO stipulations encourage leasing of a parcel and then a waiver request by the oil company so that it can drill on-site in order to economically recover oil and gas.

Mark Pearson
P.O. Box 204
Grand Junction, CO 81502

July 4, 1990

Robert V. Kille
Project Manager
Bureau of Land Management
164 Horizon Drive
Grand Junction, CO 81506

Re: Colorado Oil and Gas Leasing and Development Draft Environmental Impact Statement (DEIS)

Dear Bob:

These comments on the Colorado Oil and Gas Leasing and Development Draft Environmental Impact Statement (DEIS) are submitted on behalf of the Rocky Mountain Chapter of the Sierra Club.

It was difficult to get a feel for the leasing stipulations without the site specific maps for each resource area. I understand that BLM has budget limitations in preparing planning documents such as this one, but the handful of text pages in Appendices E and F are inadequate to convey the true sense of the DEIS. It is not reasonable to expect the interested public to travel to each of the sites to review detailed larger maps in each resource area. A better idea would could be struck by including some graphical representation of leasing categories in the DEIS.

THE RANGE OF ALTERNATIVES ANALYZED ARE INADEQUATE

The DEIS does not analyze an adequate range of alternatives as required by the National Environmental Policy Act (NEPA). The discretionary no lease areas is identical for all three alternatives. BLM has made no effort to evaluate the impacts to oil and gas development, if any, of placing additional high value surface resource lands, such as cultural areas, research natural areas, and ACECs, in a discretionary no leasing category.

There is no information contained in the DEIS to support a claim that placing oil ACECs, BLM, Special Recreation Management Areas, and other sensitive areas in no leasing categories would impact oil and gas development because there are no alternatives in the DEIS that propose no leasing stipulations on these areas. Since BLM lacks justification for not placing the areas in no leasing categories, we demand that BLM place no leasing stipulations on these

Mr. Rob Kille
July 4, 1990
Page 2

error.

It is difficult to believe that BLM has not identified any areas where non-mineral resources require protection through a leasing prohibition in the Glenwood Springs, Northeast, and San Juan/San Miguel Planning Areas. Apparently the only locations BLM will not lease are those areas where BLM does not own the surface, such as the Little Snake and Kremmling Area. Considering the wide latitude granted BLM officials in overriding leasing stipulations, the no leasing stipulation in the only stipulation that gives any assurance that surface resources will be protected.

The San Juan/San Miguel Planning area has arguably the most significant archaeological resources in the United States. Yet BLM has left the entire area open to no surface occupancy leasing at a minimum, and with provisions to drop those stipulations at the discretion of a BLM Authorized Officer. This is patently unacceptable to the Sierra Club. Only those areas which BLM cannot legally lease, the wilderness study areas, have been placed off limits to development in the DEIS. Every area in the San Juan/San Miguel Planning area listed on pages 2-4 and 8-9 for NSO stipulations should be placed in no leasing categories.

Similar comments apply to the other planning areas. ACECs and SBMA such as Crown Mountain and the Little Yampa/Uniper Canyon should be off-limits to leasing until BLM adopts a system whereby the public is entitled to full participation in decisions to waive stipulations. NSO stipulations are simply not adequate to protect the resources of state in these areas.

THE DEIS CREATES UNWARRANTED LATENCY TO AUTHORIZED OFFICERS

The Sierra Club objects to the approach of the proposed action alternative whereby the "Authorized Officer" has the sole authority to waive or modify stipulations. It has been our experience that BLM succumbs to industry pressures every time it is faced with the conflict between leasing stipulations and industry development plans. Iron-clad guarantees to uphold stipulations will be ignored, but BLM has not shown that it can be trusted to professionally evaluate development plans and to objectively implement its plans.

I am pleased with the statement in the DEIS (E-1) requiring full participation with full public participation in the event of a waiver, exception, or modification inconsistent with the stipulations.

"If the proposed waiver, exception, or modification is inconsistent with the plan, the plan will be amended or the change to the stipulation will be disallowed."

Mr. Rob Kille
July 4, 1990
Page 3

Are the public participation requirements those required by BLM's planning and management requirements? BLM has interpreted its oil and gas regulations such that projects of BLM are not allowed, including stipulations which conform to the plan (DEIS at E-1). It is inconceivable that because the DEIS does not analyze the environmental consequences of surface disturbing activities because of proposed NSO stipulations, for example, the BLM Authorized Officer might then waive an exception where no exception criterion was identified (DEIS at E-1) and allow surface occupancy in spite of the NSO stipulation. No public review would be required, with the consequence that no public review and no NEPA analysis would occur for this surface disturbing activity. Such a scenario is entirely possible given the BLM's proposed action alternative, and would clearly violate NEPA.

THE PROPOSED ACTION VIOLATES NEPA REQUIREMENTS TO ANALYZE THE ENVIRONMENTAL IMPACTS OF OIL AND GAS LEASING PRIOR TO LEASING BECAUSE OF ITS LACK OF EXEMPTION CRITERIA

The proposed action allows BLM to drop leasing stipulations at the discretion of the Authorized Officer without any public comment. "No public notice is required for exceptions to lease stipulations which conform to the plan" (DEIS at E-1). It is inconceivable that because the DEIS does not analyze the environmental consequences of surface disturbing activities because of proposed NSO stipulations, for example, the BLM Authorized Officer might then waive an exception where no exception criterion was identified (DEIS at E-1) and allow surface occupancy in spite of the NSO stipulation. No public review would be required, with the consequence that no public review and no NEPA analysis would occur for this surface disturbing activity. Such a scenario is entirely possible given the BLM's proposed action alternative, and would clearly violate NEPA.

BLM should require public notice and a 30-day public comment period in all cases in which exceptions to leasing stipulations are granted.

The only exceptions to the leasing stipulations should be identified in the DEIS. In a number of cases, the words "no exception criterion is identified" are found in the Lease stipulations, but the DEIS also states that "even where no exception criterion is identified, exceptions are considered on a case-by-case basis" (DEIS at E-1). The Sierra Club would vigorously object to a BLM Authorized Officer granting exceptions that have not been identified in the DEIS, and the environmental consequences of which have not been analyzed.

Some exception criteria are unacceptably vague. In the DEIS at E-4, lines 33 through 37 (file in unclerified since the number only goes to 31) list NSO stipulations with the exception criterion that includes "meeting objectives of management of the area and the satisfaction of the BLM Authorized Officer." The special management objectives for each of these areas should be spelled out in the DEIS, and specific plans referenced that show how these management objectives will be met. Any activity that contradicts the special management objectives for areas such as these should be subject to public

Allison Salmore - self -

How does the O&G industry convey their wishes and interests to the BLM? Wells are noisy and disturbing. These areas should not be available for lease -

Aspen, Vermilion Basin, riparian zones, recreation areas. The alternatives are too narrow.

Julius Dehn - self -

There is no discussion of horizontal drilling and its effect on the aquifers. No leasing on the Aspen area. BLM should be proactive not reactive. Should assess the need for what level of leasing is needed vs. other values. BLM should act with caution; we need to use conservation in the use of oil and gas.

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OIL AND GAS EIS

PUBLIC MEETING COMMENTS

MEMORANDUM - July 16, 1990

L.G. Truby - self -

On page 4-11 there is a discussion of waste water disposal but no mention of siting. Near Cedar Hill and Jordan there are 180 water wells and 87 have been plugged. In the coal bed methane area on page 4-12 there is a paragraph - 1st sentence - The BLM needs to discuss prevention of the depletion of the aquifer. 2nd sentence - This occurs then we will have subsidence - need to discuss siting. 3rd sentence - There are many fractures in this area. BLM needs to address the problem of compaction fracturing 2 to 3 times the alluvial pressures. This increases the overburden pressure in the area. Also need to address the problem of fracturing out of the zone intended. What is the legal requirement for the BLM listing that the Colorado set the well spacing. BLM should analyze the fact that water depletion actually allows gas production. Some areas deplete naturally. Water is going to naturally migrate. BLM should consider the New Mexico method of well casing to prevent gas migration - well casings are cemented up to the surface and water seeping wells are within 200 feet of the gas well or at least one placed in every section. Waste water should be disposed of on public lands. Not on private lands or in another state.

Carl Weston - San Juan Citizens' Alliance -

The EIS does not differentiate between coal bed methane and natural gas. EIS does not address gas migration due to hydrostatic pressure. This migrating gas can kill vegetation and burying animals. Need additional studies to measure the gas migration and also water migration. The roads associated with the oil and gas industry are not included in the non-point source program and they should be. They should also be included in the EIS, especially in protecting the 7/8 species. Disposal of toxic wastes was not described and it should be. Cannot ignore the impacts. Waste water should be disposed of properly. For example of waste water being shipped to New Mexico for disposal. The BLM needs to track this and analyze the impacts. The BLM defers to the Colo. Oil and Gas Commission. They don't have the personnel or money to properly do their job. The EIS needs to evaluate the effectiveness of the Commission to do their job. Mr. Weston submitted two documents - an article from "The New Yorker" about the effect of methane on vegetation and an EPA regulation on the wastes from oil and gas production. What are the impacts of a methane well that fractures a water course.

Mark Rimmer - San Juan Citizens' Alliance -

Referring to the O&G report on BLM management of the oil and gas program how is the BLM going to insure that this EIS is followed and that it works. BLM should also consider buying back the leases to protect important resources.

Patricia Schuler - Sierra Club -

Page 3-4, 3rd paragraph - How does this affect the BLM. Is concerned about the effectiveness of the protection for the critical wildlife water regime.

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Jan Nealeigh - self -

Is concerned that the tax incentives will encourage more drilling. The tax incentives for the coal bed methane are encouraging more drilling than for natural gas. Oil and gas is upstaging other resources.

Chuck Jones - Veridian Oil Inc -

What leases will the proposed action effect.

SIERRA CLUB

Kirk Cunningham, Chairman

Water Quality Committee

1842 Canyon Blvd., #204

Boulder, CO, 80502

Rocky Mountain Chapter

777 Grant Street Suite 506 Denver, Colorado 80203 301-461-4819

Robert W. Kline, Project Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, CO, 81506
August 10, 1990

Dear Gentlemen:

I would like to make some comments on behalf of the Water Quality Committee of the Rocky Mountain Chapter on the Oil and Gas Leasing and Development EIS, as well as some of my own comments on this document.

It is vitally important to protect water quality and riparian habitat values on public lands in oil and gas activities. I will deal first with surface water quality problems that I have seen in my ramblings about BLM lands for recreation, and that I understand exist from other sources of information. The best way to protect surface water resources is to stay out of alluvial valley floors altogether. As outlined in the book "Arroyos and Environmental Change in the Southwest", authors Cooke and Davies state that road building in the soft and easily-erodible soils of alluvial valleys is one of the historical causes of arroyo incision and propagation. If no roads exist in an Arroyo, then don't build a new one! Secondly, the soils in Arroyos tend to transmit ground water rapidly. Any contaminated water from drilling operations will tend to enter surface water faster in this case. I've seen a lot of unlined gas well water disposal pits in the desert. Arroyos around Grand Junction that looked pretty good and certainly would not get have contributed positively to the already low water quality in that area. Is it not possible to require that all waste water be trucked away for disposal in these surface-water-sensitive environments?

Certainly, oil and gas drilling operations should keep well away from areas that are new, or could be with some restoration work, riparian zones. As are well aware, riparian zones in functioning condition on BLM land are rare indeed, usually due to past and present abusive grazing practices. Approximately 80% of the BLM's original riparian zone acreage has been damaged or destroyed altogether, according to a recent O&G report. In the Sierra Club's prioritization of things, even a commodity as valuable as oil is not as valuable as functioning riparian zones on our semi-desert lands.

As far as my own opinions on this EIS are concerned, I think that the basic fault with the document is that it has not really examined a reasonable range of alternatives. One of the failures in the EIS shows this clearly when it compares the alternatives side by side: the descriptive terms are the same for each alternative, with one small exception! Surely, this approach defeats the purposes of NEPA.

Secondly, past experience and the reputation of the BLM in dealing with mineral leasing matters in general suggests to me that NSO stipulations will be subverted. If the agency really meant to exclude surface resources on environmentally sensitive lands, it should have leasing on these lands altogether! Although great strides appear to have been made recently in plant and horizontal drilling technologies, it appears to me that NSO stipulations

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Rocky Mountain Chapter
777 Grant Street Suite 606 Denver, Colorado 80203 303 • 861 • 8819

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rigorously applied will prevent any drilling in large parts of the BSO acreages. If this comes to pass, then lessees with NSO lease stipulations will have in pain and see the agency on grounds of a taking of property rights, or some such. The net result will be little or no protection to areas that deserve it, areas like sensitive wildlife habitat, roadless areas, ACECs, etc. The fact that the BLM has given complete no-lease protection to only a few percent of the public lands in question in essence says that oil and gas exploration and production are the de facto dominant use of the public lands, despite the Multiple Use and Sustained Yield Act and other laws.

I trust that in its FEIS, BLM will correct the deficiencies of this document in its environmental analysis, and grasp the nettle of the leasing question by denying the possibility of leasing in the areas that it now considers only for leasing with NSO stipulations.

Thank you for your consideration of these opinions.

Sincerely,

Kirk Cunningham
Water Quality Chairman



NATIONAL WILDLIFE FEDERATION

Rocky Mountain Natural Resources Clinic
Box 401, Fleming Lake Building, Boulder CO 80509

303 442-4552

AIRBORNE EXPRESS

August 10, 1990

Robert W. Kline, Project Manager
Bureau of Land Management
764 Hartman Drive
Grand Junction, Colorado 81506

Re: Comments on the Colorado Oil and Gas Leasing Draft Environmental Impact Statement

Dear Mr. Kline:

On behalf of the National Wildlife Federation and the Land and Water Fund, we are pleased to submit the following comments on the Draft Environmental Impact Statement ("DEIS") for Oil and Gas Leasing on Bureau of Land Management lands in the Glenwood Springs, Kremmling, and Little Snake Resource Areas and the Northeast and San Juan/San Miguel Planning Areas in Colorado.

The National Wildlife Federation ("NWF"), with over 5 million members and supporters, is the nation's largest conservation organization. Over fifty thousand residents of Colorado are members of NWF. NWF is a non-profit public interest organization committed to ensuring that our natural resources are conserved and used wisely.

The Land and Water Fund of the Rockies is a regional environmental law center providing assistance to local citizens' groups in protecting the people, natural resources, and environment of the West.

In reviewing this DEIS, we discovered several inadequacies, failures to comply with applicable statutory and case law, and unfounded assertions. For example:

- 4 4 { This DEIS fails to adequately consider the no leasing alternative, in violation of the National Environmental Policy Act ("NEPA") and the Marshall Alliance v. Hodel, 852 F.2d 1223 (9th Cir. 1988).
- 26 { Since all of the alternatives considered present the same development scenario—with no variation in the amount of acreage open to lease—the DEIS does not provide the agency and the public with a

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alternatives in comparison to other alternatives. Nor is there any discussion of the results of site-specific analysis of the no leasing alternative.

BLM attempts to justify its summary dismissal of the no leasing alternative in the DEIS at pages 2-1:

Public lands are generally available for oil and gas leasing in accordance with the public policy expressed in the Mineral Leasing Act, and BLM's mandate for true multiple use of the public lands set out in the Federal Land Policy and Management Act. The BLM believes the three alternatives presented provide an adequate range of proposals and options to make a well informed choice.

This attempted justification hardly presents a "full and meaningful" consideration of no leasing. Moreover, no reasons are provided for the "determination" that No Surface Occupancy offers adequate protection for oil resources.

In revising this DEIS, BLM should actually consider and analyze the no leasing alternative in comparison with the other alternatives in order to comply with NEPA and Federal case law. Chapter Two of the DEIS compares the three analyzed alternatives; Table 2-6 summarizes impacts by resource for each alternative. At a minimum, the no leasing alternative should be included in these comparisons; preferably, the revised DEIS will include no leasing in the full discussion of environmental consequences in Chapter Four.

II. NO BASIS FOR MEANINGFUL CHOICE AMONG ALTERNATIVES

The public and decision makers cannot make meaningful choices among the alternatives from the information and alternatives presented in the DEIS. The DEIS's alternatives present the same development scenario, with only minor variations in impacts and in protection for wildlife and other non-oil-and-gas values.

This DEIS fails to consider altering the amount of lands within the Study Area to be made available for leasing -- this amount is identical for all three of the proposed alternatives. (DEIS Tables 2-3, 2-4, and 2-6). Less than one percent of the land in the Study Area under each alternative is closed to leasing under the "discretionary no-leasing" designation. (Id.). Similarly, all three alternatives forecast an identical total number of acres disturbed and well drilled in the Study

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We recommend these areas for closure because these resources may not adequately be protected by stipulation, and the resource values in these areas often outweigh onshore oil and gas development values.

III. UNDER RELIANCE ON INADEQUATE REGIONAL STIPULATIONS

For the more than three million acres of BLM-administered land in the Study Area, Colorado BLM maintains that lease stipulations provide adequate protection for all wildlife habitat areas to be leased. (DEIS, at 2-2). This assumption is best understood and at worst simply wrong for the following reasons.

First, Timing Limitation stipulations, by their own terms, do not apply to the maintenance and operation of producing wells. (DEIS, at 2-6). While some of the timing limitations may be adopted as Conditions of Approval ("COAs") which apply to operation and maintenance phases, application of these COAs is completely within the discretion of the Authorized Officer. (DEIS, at D-11.)

Second, a recent report by the General Accounting Office ("GAO Federal Land Management Report") substantiates our concerns that COAs, even if applied, will not provide adequate protection for wildlife and recreation values. After evaluating four BLM state offices—including Colorado BLM—GAO found that, at the stages of lease issuance and approval of a drilling permit, these offices:

continue to approve some drilling permits even though additional environmental studies, identified as needed by the agencies, have not been completed; and...do not always include mitigating measures (stipulations or conditions of approval) required in the leases or permits to minimize the environmental impact of oil and gas development.

GAO Federal Land Management Report, at 25.

GAO estimates that "an average of 10 percent of drilling permits, in the offices we visited were approved without one or more of the required conditions of approval." (Id., at 31). According to the report:

⁴ The BLM asks the reader to "note that there is no commitment to the specific wording of a Condition of Approval." (DEIS at D-1). Additionally, the Authorized Officer is not required to choose any COAs until the field development stage. (Id.)

⁵ United States General Accounting Office, Federal Land Management: Better Oil and Gas Information Needed to Support Land Use Decisions, GAO/RC-90-71 (June 1990).

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Area. This tunnel vision of leasing violates NEPA,⁷ and deprives readers of a "clear basis for choice among options."

We recommend that BLM seriously evaluate whether the following areas should be closed to oil and gas leasing under BLM's discretionary authority:

- threatened and endangered species habitat including endangered bald eagle and peregrine falcon nesting, breeding and wintering areas;
- The areas used by the only nesting population of the greater sandhill crane, a state endangered species;
- crucial riparian and wetland areas (these comprise a mere 3,400 acres of the more than 1,600,000 acres in the Little Snake Resource Area, yet 80 percent of all wildlife species in the LSRA are totally dependent on riparian habitat for sustenance);
- big game calving and crucial winter range areas;
- Winter, lek and nesting habitat for grouse;
- Important waterfowl breeding and nesting habitat;
- Areas suitable for potential relocation of the endangered black-footed ferret, including BLM lands in northwest Colorado where the U.S. Fish and Wildlife Service is considering reintroducing the rarest mammal in North America;
- other areas of important wildlife habitat;
- areas managed primarily for recreational values;
- areas with unstable soils;
- Areas of Critical Environmental Concern;
- sites listed in the National Register of Historic Places.

⁷ NEPA requires Federal agencies to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unrecovered conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(a)(2). Council on Environmental Quality regulations mandate that the alternatives chosen must "thoroughly define" the issues presented and provide the agency and the public with a "clear basis for choice among options." 40 C.F.R. § 1502.14.

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Colorado BLM officials believe that drilling permits have missing conditions of approval because resource specialists responsible for identifying the potential impacts of oil and gas development on other resources did not properly review the permits to ensure all conditions were included.

Id., at 43.

The GAO report casts substantial doubt on whether BLM will enforce all conditions of approval. When BLM does not set forth mandatory conditions of approval which it has identified as necessary prior to approving an Application for Permit to Drill, significant wildlife and recreational resources are at serious risk during development and production stages.

In sum, assertions by BLM that stipulations and conditions of approval will be properly applied to drilling permits, do not provide sufficient assurance that the surrounding environment will be protected. More reliable protection measures must be applied at the leasing stage to prevent unnecessary environmental damage.

IV. NO SURFACE OCCUPANCY STIPULATIONS MAY NOT BE ADEQUATE

While we are pleased to see that BLM recognizes the need to protect certain areas with NSO stipulations, even the more stringent NSO stipulations are subject to waiver and modification,⁸ either of which compromise their protective nature. Although no exception criteria are identified for some of the site-specific NSO stipulations, this does not guarantee that BLM will not grant exceptions. BLM states at page B-1 of the DEIS that, "Even where no exception criterion is identified, exceptions are considered on a case-by-case basis."

In addition, as noted earlier, BLM's track record in monitoring and enforcing stipulations (see § IX below) casts doubt on the actual effectiveness of No Surface Occupancy Stipulations. If unenforced, an NSO stipulation is ineffective, whereas not leasing the land to begin with creates no risk to other resources.

For these reasons, we once again urge you to close more sensitive areas to leasing. Indeed, our concerns regarding protection of many of these areas are

⁸ Regarding modification, BLM states that a modification is made "when new information shows that the protective measure is unnecessarily restrictive." (DEIS, at E-1). A waiver is "the complete elimination of a stipulation from a particular lease contract. A stipulation is waived by the Authorized Officer after preparation of an environmental assessment and a decision is made that the stipulation is in question is no longer required for a particular lease." (Id.)

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substantiated by the comments of Chip Barry, Executive Director of the Colorado Department of Natural Resources:

Certain sensitive wildlife areas should be off limits to oil and gas development... Areas affected protection could include habitats of threatened and endangered species, critical wetland and riparian areas, critical nesting sites, certain nesting areas and areas vital to the survival of a species. (Chip Barry, letter of May 19, 1989 to Greg Shoepf, (emphasis added).

Despite the presence of high-quality wildlife habitat and the above-mentioned species, none of the alternatives recommends to ensure a more solid foot of wildlife habitat within the study area for discretionary closure to leasing.

V. COLORADO BLM IS UNAWARE OF THE WILDLIFE RESOURCES ON SOME LANDS OPEN TO LEASING

Some language in the DEIS suggests Colorado BLM is unaware of the wildlife resources in parts of the study area. At one point, the BLM states: "Unavoidable adverse impacts could also occur in areas where data are not sufficient to define possible impacts from oil and gas activity. The most likely situation for such impacts would be disturbances to undiscovered riparian, marine, or plant species." (DEIS at 4-8). Additionally, according to Table M-1 in the DEIS, 264.6 miles of stream and riparian habitat in the San Juan/San Miguel Planning Area have not been inventoried for species presence.

BLM should take the time to obtain information on its resources before leasing the land. The information necessary to define possible impacts from oil and gas activities is essential to a reasoned choice among the alternatives in this DEIS, since without this information the public cannot determine which resources need protection in each area. BLM does not state that the costs of obtaining the necessary information are exorbitant. Consequently, BLM should either redefeat the DEIS to include the necessary information, or justify its decision not to obtain the necessary data, for this DEIS to comply with CEQ regulations.¹

¹ The CEQ regulation establishing procedures for dealing with incomplete or unavailable information in an environmental impact statement is published at 40 C.F.R. § 1500.22.

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

(continued...)

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Until Colorado BLM possesses sufficient data to evaluate the impacts of oil and gas activity on the lands, these lands should not be considered for leasing.

VI. THE SECRETARY OF THE INTERIOR DOES NOT HAVE THE AUTHORITY TO LEASE WILDERNESS STUDY AREA LANDS

The Colorado BLM asserts that in cases involving drainage of oil and gas, the Secretary of the Interior may issue protective leases within Wilderness Study Areas ("WSAs") otherwise excluded from leasing by the Mineral Leasing Act. (BLM DEIS at 1-2.) In fact, the Mineral Leasing Act, as amended, explicitly prohibits leasing WSA lands for oil and gas exploration and development.

The Secretary shall not issue any lease under this chapter... [l]ands within Bureau of Land Management wilderness study areas.

30 U.S.C. § 226-3a(X2) (Supp. 1989). The Secretary of the Interior, through the BLM, does not have the legal authority to lease wilderness study area lands under any circumstances. (See Sierra Club Legal Defense Fund, *Project of Sale of Oil and Gas Lease Within the Colorado Wilderness Study Area*, February 6, 1990 (pretext pending)). We ask that you remove this unfounded assertion from the DEIS, at least until the protest is resolved.²

7. (continued)

(a) If the incomplete information available to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

² This protest gave several reasons why BLM does not have authority to issue protective leases in WSAs:

- First, while 43 C.F.R. § 1500.0-3(d) states that the agency has implied authority to lease lands "otherwise unavailable for leasing" when oil and gas is being drained, this regulation attempts to expand on the Secretary's authority under the Mineral Leasing Act to deal with drainage problems. The Supreme Court has held that regulations cannot expand agency authority beyond that granted by Congress. *Campbell v. Galtsof Chemical Co.*, 581 U.S. 986, 610 (1997). (The limits of the power to issue regulations are well settled. They may not extend a statute or modify its provisions.)
- Second, the Mineral Leasing Act expressly limits the Secretary's authority to redress drainage problems; the Secretary is authorized only to "negotiate..." (continued...)

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VII. INADEQUATE ANALYSIS OF IMPACTS OF OIL AND GAS ACTIVITY ON WILDLIFE

The DEIS, at 4-3 to 4-8, analyzes the impacts under each alternative of oil and gas activity on wildlife, but neglects to analyze the dangers posed to migratory birds and other animals by uncovered waste oil and chemical pits or drilling sites.

Waste oil and chemical pits have reflective surfaces which make them resemble water holes, thus attracting and harming the U.S. Fish and Wildlife Service discovered in a 1987 investigation that 228,000 birds were being killed annually in waste oil and chemical pits in eastern New Mexico alone.³ In addition to birds, mammals including deer, opossum, porcupine and rabbits have been lost to these uncovered pits.

The DEIS, at page D-35, contains the following mitigation measures concerning open pits:

Mid pits, seepage pits, and other containments used during the exploration or operation of the lease for the storage of oil and other hazardous materials shall be fenced, posted or covered. Additional protective measures may be needed to minimize hazards and prevent access to humans, livestock, waterfowl, and other wildlife.

By making the covering of pits an optional "additional protective measure," BLM has not addressed the problems caused by these pits. BLM should develop a new COA, applicable to all leases, which mandates the covering with mesh or wire of all pits and pools used for the storage of oil and hazardous chemicals.

8. (continued)

agreements whereby the United States, or the United States and its leases, shall be compensated for such drainage." 30 U.S.C. § 226(g).

- Finally, the quoted portion of 43 C.F.R. § 1500.0-3(d) conflicts with the express terms of the Mineral Leasing Act. When a regulation conflicts with the authority expressed in the statute, the regulation is invalid. *United States v. Rockledge*, 425 U.S. 188, 213-14 (1976). *United Transportation Union v. Cole*, 787 F.2d 883, 888 (10th Cir. 1986).

³ "Fatal Attractions: Oil Pits Are Death Traps for Wildlife," *Conservation 30*, NATIONAL WILDLIFE FEDERATION, August 17, 1990, at 4.

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The BLM's lack of discussion of the significant and intolerable impacts of these pits on wildlife calls into question the adequacy of the entire analysis in this DEIS of the impacts of oil and gas on wildlife.

VIII. INADEQUATE EVALUATION OF CUMULATIVE IMPACTS

In the section of Chapter 4 entitled "Cumulative impacts," Colorado BLM maintains that wildlife, vegetation, soils, water, recreation, visual, and wilderness resources will sustain no significant overall, or cumulative, impacts.⁴ We believe the one and 1/2 pages in the DEIS devoted to cumulative impacts is inadequate because Colorado BLM makes no attempt to analyze the combined impact of the proposed development and other present and future activities on these resources. For instance, Colorado BLM notes that "Riparian and wetland areas are protected by riparian and COA's, and therefore, will not be subjected to any significant impacts." DEIS at 4-21. This statement does not analyze cumulative impacts; it is silent about the impact on riparian habitat of oil and gas leasing combined with such potential development activities as logging and accelerated road-building, landrock mining, and recreation.⁵

The Government Accounting Office has raised concerns that federal agencies continually fail to perform satisfactory cumulative impact analyses.

The key element most often missing from land use plans and related environmental studies is cumulative impacts. NEPA requires that cumulative impacts be disclosed in land use plans; however, the agencies did not provide clear guidance on how to develop this information. While both agencies have improved their guidance, it is still inadequate for assessing the cumulative impacts of

⁴ "Cumulative impact" is defined in the CEQ regulation at 40 C.F.R. § 1508.27:

"Cumulative impact" is the impact on the environment which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually small but collectively significant impacts taking place over a period of time.

⁵ The discussion of the cumulative impacts on soils suffers from the same failure to look beyond the immediate impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually small but collectively significant impacts taking place over a period of time.

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oil and gas leasing and development. (GAO Federal Land Management Report, at 40).

It is apparent from the DEIS that Colorado BLM has not met GAO's concerns. The cumulative impacts discussion should be reworked so that it complies with the federal regulations by analyzing "collectively significant impacts" from all "reasonably foreseeable future actions."

IX. BLM'S ASSUMPTIONS ON MITIGATION AND RECLAMATION ARE UNFOUNDED

Colorado BLM explains the DEIS analysis relied on several assumptions, including:

- All lease terms and conditions will be adhered to and that they are effective in mitigating impacts.
- Reclamation procedures will be completed and will be successful. (DEIS, at 4-1).

The first assumption is questionable at best, as indicated in a November 1989 report by the Inspector General for the Interior Department. It found BLM's enforcement and inspection program was seriously deficient.¹³ Specifically, the Inspector General discovered that BLM state, district and resource area offices were neither uniformly enforcing regulations nor assessing penalties for violations, and that "Violations of existing regulations have resulted in environmental damage -- and a potentially substantial Government liability for plugging abandoned wells and cleaning up well sites." (Inspector General Report 90-18, at 4).

According to the report, lease operators who violate oil and gas operations regulations "often do so without the fear of being punished." (Id. at 15). Of 1,317 incidents of noncompliance with these regulations in 1988, the total amount of reported penalty assessments was only \$71,600. (Id.)¹⁴ Additionally, based on

¹³ U.S. Department of Interior, Office of Inspector General, *Audit Report: Inspection and Enforcement Program and Related Activities: Bureau of Land Management*, Report No. 90-18, November 1989.

¹⁴ A recent General Accounting Office audit found additional evidence that lease operators do not comply with oil and gas lease provisions and applicable regulations. United States General Accounting Office report on RCDD-90-09, *Mineral Leasing: Shortcomings in Onshore Federal Oil and Gas Production Verification* (June 1990), 96-07. The auditor examined citations issued for violation of oil and gas leasing regulations by its BLM field offices in New Mexico, Wyoming, and Montana between 1989 and 1988 and found that 8.9% (480 of 5,410) of the citations were for unsatisfactory environmental protection, and 2% (102) were for "surface use not in accordance with approved plan." (Id.)

FOOTNOTES CONTAINED IN DEIS, DEIR, DEIS, DEIR, DEIS, DEIR

field visits and discussions with inspectors, the authors believe that a large number of wells are either not plugged or plugged improperly; these wells "could be adversely impacting the environment." (Id.).

Given the Inspector General's findings, we feel the DEIS's environmental impacts analysis is based on the faulty assumption that all terms and conditions in each lease will be followed. With questionable enforcement of lease provisions, Colorado BLM's assumptions about impacts from oil and gas development are dubious. Accordingly, the RIS should be reworked to take a harder look at likely future impacts from oil and gas development; this second effort must not assume away impending serious future consequences.

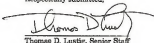
X. CONCLUSION

Colorado BLM should redraft this DEIS; the new document should consider meaningful alternatives which provide the public with a clear basis for choice among options. The additional alternatives must provide adequate protection for increasingly scarce wildlife and recreation resources.

This DEIS is of crucial importance since it revises oil and gas leasing procedures affecting 3.2 million acres of BLM-administered surface lands. The errors, flaws and inadequacies described above indicate the need for revision of the document so that it complies with federal law, common sense, and the public interest in protection of scarce natural resources.

Thank you for the opportunity to comment on this document.

Respectfully submitted,


Thomas D. Lashley, Senior Staff
Attorney, National Wildlife
Federation
Kathleen C. Zimmerman, Senior
Attorney, Land and Water
Fund
Casper Mulligan, legal intern,
National Wildlife Federation

TDL:pey

FOOTNOTES CONTAINED IN DEIS, DEIR, DEIS, DEIR, DEIS, DEIR

Mobil Exploration & Producing U.S. Inc.

P.O. Box 104
Denver, Colorado 80201-0104

Denver Division - Land
August 13, 1990

Mr. Robert W. Kline
Bureau of Land Management
764 Horizon Drive
Grand Junction, CO 81501

RESOURCE MANAGEMENT PLAN
TTL AND GAS LEASING PERMITS
GLASCOCK SPRINGS, CO.

Comments:

Mobil Exploration and Producing U.S., "Mobil" commends the BLM's decision to award the resource management plans to conform to the Supplemental Program Guidance (SPG) for fluid minerals in the Draft of Environmental Impact Statement (DEIS). This is an efficient use of time and budget allocations.

Mobil has actively acquired several million dollars in seismic and lease acquisitions in the Glascock Springs Resource Area and would like to offer you the following comments:

- 156 First, we are concerned that the BLM did not consider in this DEIS the impact of surface management oil and gas exploration and production. It seems the DEIS heavily restricts oil and gas activities through surface management without adequate justification as suggested in the SPG.
- 50 Secondly, Mobil objects to the use of "best case development" scenarios when referring to future oil and gas development. The BLM should use "reasonably foreseeable development" which would be more appropriate as requested by the Council on Environmental Quality. Mobil is committed to a clean environment as we have demonstrated in the Huerfano Creek field in Rio Blanco County and the numerous exploratory wells drilled in Rocky Mountain.
- 213 Thirdly, Mobil is unaware of any situation where seismic disrupts normal water aquifers or altered groundwater water flow which "result in reduced flows or even the loss of all water in existing springs or water wells". This was stated on page 4-2 under the proposed action alternative for livestock grazing. We believe this misrepresents potential effects the oil and gas exploration has on surface resource values.
- 187 Fourthly, Mobil feels the requirement to compensate for loss of crucial habitat is unjust. The BLM justifies the stipulation because competition among ungulates may occur as a result of a reduction in big game winter ranges, however, we feel the problem is overpopulation of ungulates that exceed the range carrying capacity. The potential effects to wildlife is equally disturbing to Mobil. The study done by Hayden-Wing and Associates for the Rocky Mountain Oil & Gas Association identified the main problems:

Mobil

Mr. Robert W. Kline
August 13, 1990
Page Two

- 1) The deer herd population is above rangeland capacity and
- 2) Over grazing has caused the browse to be in poor condition.

We believe a similar scenario can be made for the R.M. Colorado area. A copy of our interpretation of the Hayden-Wing study is attached for your information as Exhibit "A".

Furthermore, the DEIS states that a direct loss of 960 acres of habitat in any given year could be expected from oil and gas activity. This loss would not be significant to wildlife in the study area because less than .001% of the acres in the study area would be affected.

Mobil Oil Corporation is committed to working with the surface resources and hopes the BLM will balance its resource objectives.

Very truly yours,

P. W. Swets
Exploration Manager

SPC/m356
Attachment

EXHIBIT "A"

Hayden-Wing and Associates recently conducted a study for the Rocky Mountain Oil and Gas Association (RMOGA) to evaluate the impact of oil and gas activity on deer in the Tip Top Leasing Field Area in Lincoln and Siskiyou County, Wyoming.

The reports general conclusions are that there has not been any significant long-term impact caused by past intensive oil and gas activities and that male deer have habituated to this activity. It further concludes that the size of the herd and the condition of their range are the dominant controlling factors.

This study identifies two main problems.

1. The deer herd population is above the carrying capacity of the range land.
2. The browse on the range is in extremely poor condition due to overgrazing by this large herd.

Specifically Hayden-Wing had the following recommendations:

1. The USFS-BLM stipulation prohibiting surface disturbance on male deer winter range from November 15 to April 30 be dropped. There is no correlation between deer mortality and drilling activity.
2. The evidence of uncertain shrub communities should be encouraged but not absolutely prohibited when building roads and drill pads.
3. Management emphasis should be on reducing the male deer herd to levels that are desirable and sustainable by the winter habitats. The BLM in cooperation with the WFO should agree on what this population level is and then manipulate and manage grazing allotments and further harvest programs so as to maintain the browse forage required to sustain it.
4. Oil and gas operations should be required to cooperate in browse reclamation by establishing desired species of plants during their reclamation of roads and well sites. The BLM needs to act this as a goal to encourage to the operators the use of these desired species of plants.
5. Oil and gas and other surface users should cooperate in a program of winter road closures that will not create undue hardship to surface user needs but at the same time restrict access of the general public to the winter range. Such closures are aimed primarily at the prevention of harassment of deer by noticed recreationalists.
6. Male deer should not be lumped into the same stipulation with elk and big horn sheep because of the great dissimilarity in their behavioral responses to human activity.

(The original of this letter is hand written; it was typed for clarity prior to reproduction here)

VINSTAINER SHEEP CO.
Box 395
Orma, Colorado 81625
Aug. 11, 1990

Robert W. Kline, Project Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, Colorado

Dear Mr. Kline,

233 On split estate this document does not address the problem of leasing and drilling on private lands, yet wildlife is granted relief. The expense of all the change over the last several years is brushed aside for energy development.

234 In Chapter 4, page 5 a paragraph on reclamation on split estate leaves the private land owner with little or no control over reclamation and water diversion from drilling pads. If you can afford court action then you have recourse.

On page 3-14 paragraph dealing with well site development and revegetation on split estate lands does not happen in many instances. Run off and erosion were not taken care of timely before the damage has spread beyond the drilling site.

Sincerely,

Dean Vinstainer

Exhibit "B" (continued)

We feel that a similar problem exists in many of the areas that we currently operate in and are desirous of drilling on. Big game herds are too large and the browse is in poor condition.

We would encourage the BLM and the Colorado Division of Wildlife to adopt the recommendations of the Hayden-Wing report for their respective areas in Colorado.



777 Grant Street, Suite 100
Denver, Colorado 80203-3218 • (303) 733-1111

Robert W. Kline, Project Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, CO 81506

Re: Comments on the Colorado BLM Oil and Gas Leasing Development Draft Environmental Impact Statement

Dear Mr. Kline,

The following are comments of the Colorado Environmentalists Coalition (CEC) in regards to the Colorado BLM Oil and Gas Leasing and Development Draft Environmental Impact Statement. CEC is a non-profit environmental organization with over 1,000 individual members and 38 member organizations with a combined membership of over 50,000 individuals.

SITE-SPECIFIC MAPS NEEDED AS PART OF DEIS

27 The DEIS is very difficult to comprehend without site-specific maps for each resource area. The public has no firm concept of what lands are affected by the particular lease stipulations. CEC currently monitors the BLM Lease Sale in Colorado. Without any maps we are severely hindered in our ability to monitor oil and gas leasing. We feel a map with a 1:250,000 scale that shows accuracy down to 40 acres should accompany this document. The map should illustrate which stipulations are in place on each 40 acres of land. All previous BLM planning documents have included maps. Why can't the BLM include maps in this DEIS?

DEIS LACKS ADEQUATE ANALYSIS OF SITE-SPECIFIC IMPACTS

228 If the BLM intends for this DEIS to be the document that decides what lands will be leased and how they will be leased for oil and gas development, then a much more thorough study of the indirect, direct, and cumulative impacts to specific areas must be undertaken. Although the DEIS does discuss where the BLM foresees future development occurring and at what level of development will occur, the DEIS does not take the next step and adequately discuss what the likely site-specific impacts from this development will be.

The BLM glosses over what the impacts to a particular 1/4 section of land to north, north north to boundary.

Robert Kline
August 14, 1990
Page Two

resource will be by stating that the impact that does occur due to oil and gas development will happen on only a very small portion of the entire study area. This reasoning is flawed. The reader already knows that the impacts will occur in a small area by looking at Appendix E. There is no way the BLM can force oil and gas development occurring. What is not known is what the impacts on a specific parcel will be. How can the public and BLM land managers make informed decisions on whether a particular parcel should be open to oil and gas development if the impacts to this particular parcel are not known? When looking at the impacts on a specific site, the BLM must consider all stages of development through full-field production.

CEC reminds the BLM that, under NEPA, the environmental impacts of the proposed action must be assessed before oil and gas leases are issued, since leasing constitutes an irreversible and irretrievable commitment of resources. The current site-specific environmental analysis fails to address these impacts.

RANGE OF ALTERNATIVES INADEQUATE

CEC strongly disagrees with the BLM that the three alternatives presented provide an adequate range of proposals and options to make a well informed choice. According to Table 2-9 on page 2-6 of the DEIS the three alternatives have nearly identical impacts on other resources. In addition, the three alternatives open the exact same amount of acreage to oil and gas leasing/development. This lack of meaningful choices among alternatives violates NEPA.

CEC insists that the BLM consider the no-lease option on a parcel by parcel basis on all of its lands covered by this DEIS. On page 2-1 of the DEIS you state, "as an alternative of no leasing over the entire Study Area was considered, but not analyzed. No leasing was considered and analyzed on a more site-specific basis as part of the analyzed alternative." There is no reference throughout the document, however, where no-leasing is discussed as part of a site-specific analysis. CEC believes that there are parcels of land in the study area where a fundamental conflict between oil and gas development and other resources on that land exists. In these cases, where important resources will be irreversibly harmed or destroyed, the BLM should use its discretionary no-lease authority granted by Congress to protect other resources.

UNIQUE RELIANCE ON NSO STIPULATIONS TO PROTECT RESOURCES

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Page Four

white and public participation is warranted.

While the DEIS states that when a critical wildlife habitat or endangered plant habitat shrinks a stipulation waiver or modification will be made, what happens when a critical habitat expands? Will a stipulation be modified by the authorizing officer to cover a larger area if a critical habitat expands?

PRIVATE SURFACE OVER FEDERAL MINERAL ESTATE NOT ANALYZED

The DEIS fails to discuss how the surface resources of non-federal lands which are underlain by federal mineral estate are to be protected from the impacts of oil and gas development. For example, on page 1-6 the DEIS states that all actions that disturb the surface require protection of historical, paleontological, and archeological resources on privately owned surface lands where federal action, such as a Federal Oil and Gas Lease, is taking place. Yet from our examination of the DEIS it appears that there was virtually no environmental analysis of these 1.7 million acres of private surface land. Page 1-1 of the DEIS states that stipulations are evaluated for use on all federal mineral estate regardless of surface ownership. Yet nowhere in Appendix E (the stipulations attached for use on surface parcels) if the BLM intends to lease the minerals below these private surface lands they must complete the same site-specific analysis on these lands as they are required to do on federal lands.

CEC has discovered that leasing of the federal mineral estate on non-federal lands is a serious problem with the BLM's current oil and gas leasing program. In the August 1990 BLM Lease Sale CEC discovered that lease parcels offered for sale on a state wildlife area with no stipulations attached. When we contacted the Colorado Division of Wildlife to see if this was adequate to protect the surface resources of the wildlife area, they responded that they were unaware that a lease was even being offered. (They are currently reviewing the lease.) If stipulations were withdrawn from the lease sale or if stipulations can adequately protect the surface resources of the wildlife area, the time for this kind of analysis is not at the time of the lease sale, but during the oil and gas development planning stage.

BLM DOES NOT HAVE AUTHORITY TO LEASE WSAs

CEC strongly disagrees with the statement on page 1-2 of the DEIS which says, "In order to protect the United States from loss of revenues resulting from the drainage of oil and gas under

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Page Three

While reading the DEIS it is obvious that the BLM believes that all resource conflicts can be solved through the stipulations. CEC strongly disagrees with this belief. Use of stipulations to protect the rights of surface resource lands, especially the no surface occupancy (NSO) stipulation, does not avoid the conflict between oil and gas and other resources, it only delays the day that tough decisions will have to be made.

NSO stipulations on large tracts of land keep the door open for oil and gas development to occur on these lands. By placing a NSO stipulation on large areas encompassing many square miles, the BLM does not allow a realistic way for oil and gas companies to get at their oil and gas property right. Yet under the law, a company holding such a lease with a NSO stipulation still has the right to be able to get to their property. The company will request a waiver of the NSO stipulation since they cannot get to the field minerals any other way. BLM will be forced to waive this stipulation under the threat of a lawsuit by the company. Meaningful environmental organizations will be forced to go to court to stop the drilling in order to protect the resources the NSO stipulation was supposed to be in the first place.

Rather than set up the scenario for a bloody fight in the future, the BLM should use its no-lease authority, not a NSO stipulation, to protect those lands where there is a fundamental conflict between oil and gas development and other resources. BLM must face the fact that oil and gas activity on these lands is incompatible with the other resources found on these lands. CEC believes that all the lands listed as needing a NSO lease stipulation in the DEIS should instead be placed under no-lease by the BLM.

TOO MUCH LATITUDE GRANTED TO AUTHORIZED OFFICER

CEC is distressed by the power the DEIS gives to its authorizing officers to use the field to grant waivers, exceptions, and modifications to stipulations that "conform to the plan," thus effectively leaving the public out of the planning process. Past experience has shown us that when faced by pressure from industry to modify or waive a stipulation, the BLM has always done so. While in the planning document if it is not easily and frequently be changed, as the following statement on page 1-1 suggests: "Even where the 'no-lease' category is identified, exceptions are considered on a case-by-case basis." While an exception to a stipulation might be warranted in some situations, such as decreasing the amount of time a critical stipulation requiring stipulation is in place because of a mild winter, CEC feels that other stipulation modifications are not so black and

Robert Kline
August 14, 1990
Page Five

lands closed to leasing, the Secretary of the Interior has authority to issue protective leases within areas otherwise unavailable for leasing. Since when does the BLM have the ability to overrule to wishes of Congress concerning all oil and gas development in BLM wilderness study areas? CEC believes the BLM use the lands the least amount of disturbance possible under any circumstances. (See Sierra Club Legal Defense Fund, Protect of 30% of Oil and Gas Lease Sale, February 1989, p. 10) The BLM should not use the "no-lease" category as a way to remove lands from the DEIS.

AREAS THAT NEED NO-LEASE PROTECTION

As stated earlier in these comments, CEC believes all the high resource value areas that the BLM recommended in the DEIS as needing a NSO stipulation should instead be placed in the no-lease category. In addition to these areas, there are other areas we feel are incompatible with oil and gas development and thus need to be placed under no-lease.

1. Wetlands in all five resource areas. Currently only wetlands in the Greening Resource Area are identified as needing protection.
2. Fragile soil areas. CEC believes conditions of approval attached to the drilling permit are not enough to prevent massive erosion problems in these areas.
3. The Vermilion Basin area, including the Irish Canyon and Lookout Mountain ACECs. CEC believes that the BLM should not treat these two ACECs like all the other ACECs in the study area and identify them as needing a NSO stipulation. These ACECs have many outstanding resources that are incompatible with oil and gas development, including: cultural resources, fragile soils, and possible black oil seeps. Furthermore, these two ACECs are part of a vast roadless area where oil and gas activities have taken place in the past. Please refer to the enclosed maps for the boundaries of the Vermilion Basin area we feel needs protection.
4. The semi-primitive nonmotorized area around Sunlight Peak. The DEIS states that Sunlight Peak may be affected by road construction if roads are built nearby. CEC believes this area must continue to managed to protect its semi-primitive quality.

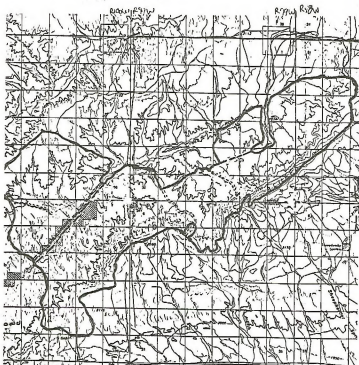
CONCLUSION

After thoroughly reviewing the DEIS, CEC has found numerous instances where the BLM has failed to follow the appropriate regulations that apply to the environmental analysis of oil and

Enc. Two maps of Vermillion Basin Area



----- May
----- Proposed boundary



TRAPPER MINING INC

August 14, 1990

Mr. Robert W. Kline, Project Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, CO 81506

Dear Mr. Kline:

I am writing to offer the comments of Trapper Mining Inc. (Trapper) on the BLM's draft Colorado Oil and Gas Leasing environmental impact statement (EIS). Trapper operates the Trapper Mine, a surface coal mine in northwest Colorado, which is one of the three largest coal-producing mines in the state. The land and mineral ownership at Trapper is mixed, including: private and state surface; private, county, state, and federal coal; and private, county, or coincident state and federal oil and gas.

Trapper is delivering coal under a 35-year contract executed in March, 1973. Virtually all of Trapper's surface mineable reserves will be required to fulfill the obligations of this contract. Our concern with the BLM's plans for oil and gas leasing stems from the agency's policy of leasing oil and gas coincident with the life of mine plan area of a permitted and active coal mine. This policy poses a substantial threat to an operation such as Trapper and yet the impacts are not addressed at all in the draft EIS.

if an oil and gas well is drilled in the path of our planned mining operations, numerous problems result. Under Colorado Mined Land Reclamation Division regulations (6.08.477)(b), blasting cannot be conducted within 500 feet of a facility such as an oil or gas well or a pipeline unless a variance can be obtained. The federal Office of Surface Mining regulations (30 CFR 815.67(d) and 817.67(d)) also limit blasting in the area of facilities such as an oil or gas well or pipeline.

A coal company also faces safety, production, and economic impacts if oil wells are drilled on their mining area. Once a well is established, a coal company has only three alternatives: (1) negotiate a temporary abandonment with the oil company, plug the well, mine through the area, and reestablish the well; (2) negotiate a permanent abandonment with the oil company; or (3) currently estimated that a 500-foot radius is acceptable) and lease the revenue from the unmined coal (the state and federal governments would also lose the royalty payments on unmined coal). The first alternative would require the coal company to mine through the area and leave the well non-producing. All of these alternatives would result in economic hardship to the coal company while the oil company incurs no economic loss. There will also be some production losses due to roads, pipelines and other encroachments to the oil wells.

Existing law assumes a first in time, first in right standard in determining the priority for coincidental mineral owners with conflicting interests. Unfortunately for a coal operator, this concept has been interpreted to mean the first physical presence of a structure or facility - not a permit area or other non-physical commitment to a specific geographical point. The Trapper Mine is a good example of the problems that can develop for a coal operator under this approach. Though Trapper has committed over \$40 million in capital

to its operation, obtained all required state and federal permits, and been in operation since the mid '70's, an oil and gas company can obtain a federal oil and gas lease and in a matter of weeks begin drilling on coal in Trapper's permit area - coal that is needed to fulfill our 33-year contractual obligation. Trapper cannot pump and save its operation when this occurs. It can not utilize the oil and gas rig and the time required for us to obtain leases, permits and contracts in years - not weeks as it is for the oil and gas industry.

According to Trapper's latest file of mine plan, there are just enough reserves to meet contract commitments. If an oil company borrows a promising reserve in the same area and develops producing wells, Trapper will be forced to try to "deal" with the oil company, find alternative reserves, or perhaps default on its contractual obligations. With the requirement of a 300-foot buffer between oil well structures and blasting operations, a 150-foot highwall at one half to one (loss of 375 feet of coal around the well) equates to a loss of about \$30,000 per acre or about 4.3 million total tons if five wells are developed. Although Trapper needs these reserves to meet its existing contracts, the oil company is not required to even negotiate with Trapper even though the coal mine has been in existence many years before such oil wells would be drilled. Since Trapper is first in time, the oil company should be required to assume all the risks and costs of abandoning such a well to allow Trapper access to permitted coal and reestablishment of the well. This is a risk that would clearly favor the project before Trapper began Trapper could not. The most practical solution would be to prohibit drilling wells in a life of mine permit area in the first place.

On the other hand, had the oil wells already been in existence, Trapper could have pre-negotiated an agreement, realized these costs beforehand, and made economic decisions on the project. At least their mining plans could include the loss of coal around the wells. In this case, the oil company would have the first in time, first in right priority.

Underground mines also are not exempt from problems created by wells. They will be faced with the same abandonment problem of leaving a large reserve of coal unused. This would be particularly difficult for a modern longwall operation to deal with a well. Having a longwall set up to avoid a well is very expensive and may not be feasible at all.

The above scenario is a very simplistic view of a complicated issue. As the leasing rules stand now, a coal developer has no way of protecting vested interests from oil and gas developers. The federal government is causing a contradiction within itself because of leasing and permitting policies. They give the right and even mandate through diligence and optimum recovery requirements to allow the coal in a given area with certain caveats and then allow other leases (oil and gas) in the same location that will hinder the required development. The right is given and then taken away. The RM can correct this inequality and as part of their leasing process do not lease where a permitted mine exists. The "first in time, first in right" concept is a fair way to insure both parties interests are protected as long as a permit/lease is considered first in time.

Sincerely,

Frank M. Salt
Frank M. Salt
Safety Manager

DMS/Rev/OTO
File 300.3

(The original of this letter is handwritten; it was typed for clarity prior to reproduction.)

Robert W. Kline
Bureau of Land Management
764 Horizon Dr.
Grand Junction, CO 81508

August 10, 1990

Dear Mr. Kline,

I appreciate this opportunity to comment on the Colorado Oil and Gas Leasing Environmental Impact Statement.

The plan is lacking in information in almost every respect. The reader of this document is not given adequate information on the impacts or restrictions that will be placed on oil and gas development.

The plan fails to include many potential alternatives including a no lease alternative. The BLM should examine the following additional types of alternatives at a minimum:

- "No Lease" Alternative - where lands in all the resource areas are made off limits to leasing.

- A natural resource protection alternative where:
ACRMC: BSWs; critical winter range, birthing areas, and migration routes for wildlife; rare, threatened, and endangered wildlife habitat; fragile soil and steep slope areas; cultural and historic sites; and paleontological sites are made off limits to leasing.

In fact, your own comparison of the alternatives that you examined (table 4-6) shows little difference between the three alternatives examined in the plan.

Fragile Soils and Steep Slopes

Why has the BLM failed to protect fragile soil and steep slope areas from the adverse effects of oil and gas exploration, development, and production?

Almost all BSWs in the action have provided this basic protection. Your plan totally ignores any protection for these areas. I recommend that NSO stipulations at a minimum be placed on all lands with slopes over 40% and on all fragile soil areas. The plan only proposes Controlled Surface Use stipulations for fragile soil areas in TMD of the five resource areas. Why do the other three resource areas not have this protection? However, Controlled Surface Use stipulations are very weak. NSO or no lease would provide proper protection.

ACRMC

Why have Irish Canyon ACRMC and Lookout Mountain ACRMC not been given the same degree of protection (NSO stipulations) as the other ACRMCs that were not aside

to protect sensitive plant communities? It seems that these two areas need to provide the same protection as the other ACRMCs in the five resource area.

My old Appendix II fell to include avoidance stipulations for the Anasazi Cultural Multiple Use ACRMC. Is the BLM planning on weakening the inadequate protection the area now has? I support very restrictive stipulations in this area which would prohibit any oil and gas exploration, development, or production which would harm cultural sites or increase losses to paleontologists in the area.

The BLM should require that any company drilling in this area must pay for BLM surveillance and protection of cultural sites. I also understand a very unusual species of fish is found in the Cross and Cabane Canyons. No mention of this fish is made in the report. These canyons are located in the Anasazi Cultural ACRMC.

Boreation

The plan does not treat all BSWs equally. The Krummhorn B.A. has NSO stipulations for its BSWs. Little Snake B.A. has NSO stipulations. No mention in the plan is made for the Eagle River BSW. Has this area been given an NSO stipulation? The San Juan/San Miguel B.A. protected only the Dolores BSW with NSO stipulation. Why have the Josted and San Juan Triangles BSWs not been given the same level of protection? My opinion is that all of these areas should be closed to leasing.

Paleontology

The plan claims that all areas over 40 acres designated for protection of paleontological resources will receive an NSO stipulation. The plan, however, does not provide a list of these areas. Why was this neglected?

Wildlife

The plan failed to provide any maps where timing stipulations for wildlife will be placed. This is a blatant violation of NSO. I, for one, do not like the way in which the BLM is trying to keep the public in the dark regarding where these stipulations are to be placed. The Colorado State Office of BLM has a chronic problem of not placing proper stipulations on leases.

View the lack of maps as an attempt by the BLM of trying to prevent any citizen oversight of implementation of this plan.

In conclusion, this EIS is totally inadequate at addressing the impact associated with oil and gas exploration, development, and production. The fails to even begin examining the impacts associated with the development and production phases.

Thank you for the opportunity to comment.

Sincerely yours
Kirk Koppel
149 E. Thompson # 4
Berkeley, NY 82801

CCG PROPERTY DATA
Form 100
Rev. 03/89
501-983-677
501-983-6544



August 13, 1990

Mr. Robert W. Kline, Project Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, CO 81506

Dear Mr. Kline:

Thank you for the opportunity to comment on the Colorado Oil and Gas Leasing EIS. We would appreciate your consideration of our concerns expressed in this letter.

CGD has had extensive experience with all types of geophysical exploration techniques, and has been instrumental in pioneering several of the methods used today. Additionally, we have worked in many areas of the western U.S. and are familiar with the disparate requirements of landowners and government agencies in relation to exploration. We have looked at the Colorado EIS for oil and gas leasing from a geophysical contractor's perspective and feel that there are several areas where further discussion is warranted. We feel that the restrictions as proposed for geophysical operations are, in many cases, more than is necessary for adequate protection of the resources.

Some of our concerns are as follows:

- Appendix A under geophysical exploration: "logs" are no longer casetapes (paragraph 1, page A-1); they are now strung in a series of up to 20 per group, weighing 10 tons. The groups are placed every 30-300 feet along the seismic line.

- Next sentence paragraph 3, page A-1: sometimes the only connection for the recorder truck is a radio wave. By using full radio telemetry the recorder can be placed miles away from the seismic line.

- Additionally, the "dumper method" is not used currently and should not be considered a common method of exploration.

- The vibrator method is replacing the explosive method in accessible areas" (A-2, paragraph 3). This statement is not true.

- "Detection of the charge in some areas causes no surface disturbance while in others a small crater... is created" (A-2, paragraph 3) No operations today "craters" craters as all holes are backfilled and topped before shooting.



Mr. Robert W. Kline
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The most several sentences of paragraph 3 should be rewritten to incorporate Rule 33a of the Colorado Oil and Gas Conservation Commission which describes an operator's responsibilities for plugging and abandonment of seismic shuttles (copy of Rule 33a attached).

256 The most important areas which we feel require modification as well as further discussion is Appendix B - Congressional Operations. Specifically, our concerns are as follows:

241 A. Notification: The description for this chapter needs to be completed with regard to the pending changes to the Notice of Intent (NOI) system. These potential changes from the Washington office may cause this portion along with other areas of the document to need to be rewritten.

257 C. Cultural Resources: The first sentence together with most of the rest of the chapter go beyond the requirements of Section 106 of the National Historic Preservation Act. A Class III inventory may be required only if there is a strong likelihood of sites eligible for inclusion in the National Register of Historic Places. It is the duty of the Bureau to determine those areas which are likely to contain sites eligible and not to categorically require Class III inventories "on those portions of a seismic line crossing BLM surface." We take exception to the premise that we must be responsible for "100% cultural resource inventory of the areas...."

244 D. Threatened, endangered and sensitive species: It is not possible to argue that the whole resource area is potential habitat? We would suggest that a map showing those areas of concern be circulated so that operators may see potential concerns in advance.

245 E. Construction: Paragraph 3, "However... within 1/4 mile to springs, wells or impoundments..." Vibrocasts is a safe, controllable energy source that is used in heavily populated down town areas. To restrict that source from springs 1/4 mile is unnecessary. Studies have been done which show that 50 lbs. of explosives may be detonated within 250' of springs with no effect. Likewise, Vibrocast operations need only limit themselves to such distances to allow the driver safe passage around the well or other physical barrier.

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245 F. Explosives: The Washington office is currently dealing with this issue in a way that corrects the misperceptions inherent in "loaded shuttles shall not be left unattended". These language states "loaded shuttles shall not be left unattended according to ATF techniques. Powder magazines should be stored and handled according to ATF standards and not be confused with any other applicable federal, state, or local regulations.

255 G. Misstatements: The last paragraph (p. 3-11). How many of these facts exist? Why is there a 24 hour restriction? Is there no happy medium which allows both users access during different parts of the day? There must be a reasonable alternative.

We would be happy to meet with your office at your convenience to discuss possible modifications to the EIS. We would like to be of specific assistance in developing some changes in the new EIS that both meet your needs and allow industry to operate in a reasonable manner consistent with statutory requirements and environmental sensitivities. I will call your office next week to arrange a meeting.

Sincerely yours,

J.C. Woodward
Fogel Chairman,
RMC Rocky Mountain Operating Committee

FWK/dl
Attachment

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Mr. Robert W. Kline
Project Manager
Bureau of Land Management
784 Horizon Drive
Grand Junction, CO 81503

Dear Mr. Kline:

On behalf of the Rocky Mountain Oil & Gas Association (RMOGA) and the Colorado Petroleum Association (CPA), the following comments are submitted on the Draft Environmental Impact Statement (DEIS) on Oil and Gas Leasing in Five Resource Areas in Colorado. RMOGA is a trade association representing more than four hundred members and member companies who account for more than 90% of the oil and gas exploration, production and transportation activities in the Rocky Mountain West. Consequently, we have very strong interests in how oil and gas leasing and development will be managed and facilitated by the Colorado BLM.

We support the Colorado BLM's decision to amend the Resource Management Plans (RMPs) for the Grand Springs, Kremmling, Little Snake, Northwest, and San Juan/San Miguel Resource Areas to conform to the Supplemental Program Guidance (SPG) for Fluid Minerals in one environmental impact statement. The which BLM has demonstrated a wise use of its time and budget allocations and, therefore, sets a good example for other BLM offices, as well as other agencies, which must also update the oil and gas leasing analyses contained in their management plans.

233 We are disturbed, however, that the BLM believes it can adequately address oil and gas leasing without considering the effects of surface management decisions on oil and gas opportunities. No issues relating to the impacts on opportunities to explore for and develop oil and gas which could result from surface management were addressed in the DEIS. In fact such issues were raised during scoping for this DEIS by RMOGA. We do not believe it is possible to make trade-off decisions among uses without fully weighing the geological and

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42 developmental potential of an area against surface values. The BLM's Supplemental Program Guidance for Fluid Minerals directs that areas with high potential for oil and gas resources should receive special attention in the planning process. We are concerned that this has not been done. Rather, the DEIS focuses only upon the opportunity to heavily restrict oil and gas activities without adequate justification.

163 While we support the BLM's comprehensive approach for this leasing analysis, such an approach is not without its problems, especially when used for the first time. Significant clarification must be made throughout the document. Specifically, the tables need to be verified, as do the cross-references using chapters. For example, on page 4-1, it is stated that vibrator wells would result in the loss of approximately 10 acres of vegetation per well, or a total of 19,000 acres (from 1,900 wells) over a 20-year period. Yet page 4-22 states that as many as 1,793 wells could be drilled. However, on page 4-2, Table 2-1 identifies the projected number of wells as 1,788. The discrepancies do not seem to be considered reasonable, the level of impacts are also arbitrarily increased. Consequently, lease and operating restrictions would also be increased in an effort to provide "adequate" protection to surface resources in accordance with the impact analysis.

50 We strongly object to the use of "worst case scenarios" when predicting future oil and gas development. The Council on Environmental Quality (CEQ) regulations specifically direct that the use of worst case scenarios is inappropriate in NEPA analyses. Instead, the CEQ directs that "reasonably foreseeable development" be considered along with its cumulative effects. By arbitrarily increasing the projected level of development far beyond what would be considered reasonable, the level of impacts are also arbitrarily increased. Consequently, lease and operating restrictions would also be increased in an effort to provide "adequate" protection to surface resources in accordance with the impact analysis.

45 While we recognize the BLM is fearful that its NEPA analysis "remains valid only for as long as drilling activity is at or below the levels assumed for analysis purposes", this view is of great concern to RMOGA. The number of wells drilled must not be the deciding factor whether further NEPA analysis is required. If the level of impacts analyzed in the document has not been reached, even if twice as many wells have been drilled than predicted, the NEPA document should still be valid.

48 There should be no need to double the number of projected wells to ensure a long life for the NEPA documentation. Determinations as to whether the NEPA analysis is adequate must not be based solely upon the number of wells that have

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been drilled in an area. Such determinations must also consider how many wellbores are producing, how many are shut in, and what types of mitigation measures employed. For instance, the BLM may predict that 500 wells could be drilled within a well-defined area, but if 100 of these wells were plugged, abandoned and reclaimed, then obviously the level of impacts associated with 500 wells has not been reached. Consequently, no additional NEPA analysis should be necessary until 500 wells are actually producing in the area. The distinction must be made between exploration and producing wells. Furthermore, even if the threshold is reached, the BLM should be able to handle with a supplement to the existing documentation, rather than with a whole new analysis.

- 1.4 Chapter 4, Environmental Consequences, modestly exaggerates and misrepresents potential effects of oil and gas exploration and development stipulations on surface resource values. Neither standard nor special stipulations are explained or discussed yet they are designed to significantly reduce or eliminate nearly all of the impacts identified. The manner in which potential effects are discussed in this chapter serves only to inflate public sentiment against oil and gas activities.

For example, on page 4-2, Proposed Action Alternative, under Livestock Grazing, it is stated, "Sismic activities utilizing explosive charges, thumpers, etc., could disrupt normal water seepages, altering subsurface water flows. This could result in reduced flows or even the loss of all water to existing springs and water wells." How often has this situation actually occurred, and is it documented? We are unaware of any study which supports base allegations. In fact, there are objective studies which indicate that seismic activities as close as 250 feet to springs have had no impact on the subsurface water flow or seepages. Furthermore, thumpers have not been in use for many years. It is possible that the BLM intended to refer to vibroseis trucks rather than thumpers. In that case, however, studies have shown that vibroseis exploration can take place within 10 feet of a sensitive resource without impact. In fact, the only reason for the 50-foot avoidance is to avert problems associated with human error. Finally, because the industry regularly drills and taps holes before shooting, no geophysical operations today create "small craters".

- 1.4 We object to the BLM's failure to discuss potential effects which could reasonably occur during seismic activities. It would appear that the BLM is intent upon identifying bizarre situations that have no factual basis as if they were commonplace occurrences.

The discussion on potential effects to wildlife is equally unsettling. The BLM indicates that under the Preferred Alternative, effects from all oil and gas

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- 1.2 Acres of which would be reclaimed would be disturbed in any given year. For the sake of this discussion, we will not dispute this figure, even though it appears to be very high. According to Chapter 3 of the GEIS, male deer winter range is comprised of nearly 392,000 acres, over 200,000 acres of which are critical habitats. Elk winter range is comprised of nearly 330,000 acres, nearly 155,000 acres considered critical. Obviously, surface disturbance on 78.8 acres would have little or no effect on either of these species or their habitats. Nor are any significant impacts expected to any other species. The level of impacts projected from oil and gas activities does not in any way support the conclusion that a special stipulation requiring habitat replacement is necessary. Therefore, this special stipulation should be dropped from further consideration and eliminated from the final EIS.

The BLM's mandate is to manage its lands for multiple-use. In the overall scheme of things, commodity uses must not be subjected to more restrictive management practices than other uses. Oil and gas resource uses are of equal importance as wildlife or recreation uses. In the interest of surface resources, however, oil and gas activities are required to be conducted in an environmentally sound manner with particular attention given to protecting surface values. This does not mean that the oil and gas industry should be required to remove wildlife habitat, particularly when the habitat is created due to uncontrolled population growth. The oil and gas industry should not be singled out and penalized for something over which it has no control.

- 5.7 Another question regarding the GEIS is the staggering increase in restrictive stipulations proposed in the Preferred Alternative. How can the BLM possibly justify an increase of No-Surface-Occupancy (NSO) stipulations from 25,000 acres to a whopping 389,418 acres? This will leave a total of 332,173 acres, less than half the resource Area, available for lease with any type of surface occupancy. The management allows leasing with surface occupancy over 90% of the Resource Area. To make matters worse, the BLM proposed to restrict surface use stipulations on 470,000 acres, as well as timing limitations on over 717,000 acres. These restrictive stipulations appear to be proposed for application on least twice or every acre available to invasion with surface occupancy. The BLM's management appears intent on paralyzing any type of oil and gas program in the area.

What has happened in the resource area since the plan was adopted that would require such an increase in restrictive stipulations? Our review indicates very little has changed, if anything. The comparison of alternatives displayed on page 2-3 indicates that the difference among alternatives is minimal regarding impacts which would require a need for more restrictive stipulations in the Resource Area. In other words, the use of standard terms and conditions throughout the

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activities would be most significant during critical seasons when the animals are already under substantial stress. Yet, timing limitations would be applied to all new leases issued in the study area in order to ameliorate such impacts. Consequently, implementation of the proposed action will not result in the effects described in the EIS.

We strongly recommend that the BLM improve the final EIS by presenting an accurate picture of effects which are reasonable to expect upon implementation of each of the alternatives. As currently written, Chapter 4 represents a "worst case scenario" which does not acknowledge that even the minimum standards and conditions applied to all activities under the most restrictive stipulations provide the basis for protection of surface resources. The BLM must limit its discussions to potential effects which could occur only after stipulations have been applied in accordance with alternative direction.

- 6.1 We are singularly opposed to the proposed stipulation which would require oil and gas leases to compensate for the loss of crucial habitat, as proposed by the Glenrose Springs Resource Area. Compensation could be required either on-site or off-site--decisions for which would be made on a case-by-case basis. There is no need for such a stipulation. The BLM has always been able to work with operators to reach mutually agreeable solutions to perceived problems rather than resorting to a binding stipulation.

However, such a stipulation is unwarranted because the effects expected from oil and gas activities are not significant. As justification for the stipulation, the BLM cites potential competition among ungulates in big game winter range due to loss of habitat from oil and gas activities. According to the BLM, the magnitude of this impact would be site-specific and could be minimized through compensatory habitat enhancement. The level of oil and gas activity predicted by the BLM does not support the claim that ungulates would be forced to compete for winter range due to oil and gas operations. Competition for winter range would more likely stem from overpopulation.

- 1.5 The GEIS states on page 4-3 that a direct loss of 960 acres of habitat in any given year, or 19,000 acres over 20 years, could be expected from oil and gas activities. Such a loss would cause a slight impact to wildlife in the study area. Less than 0.005% of the 5 million-acre study area would be affected over a 20-year period.

- 1.6 Specifically regarding the GEIS, under the proposed action a maximum of 84 acres would be drilled each year for the next 20 years. This amount is an average of 2.7 wells per year, or 27 acres of surface disturbance. It is unclear how the BLM arrived at the conclusion that approximately 78.8 acres (25

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area would cause very small, if any, increases in impacts associated with oil and gas activities when compared with current management or the Preferred Alternative.

- 4.9 The BLM is required by regulation and policy to justify the use of more restrictive stipulations over less restrictive stipulations. The BLM indicates on page 2-4 it has complied with this direction. However, the evidence presented in the GEIS does not indicate that this is true. In fact, the analysis indicates there is no need even for the restrictive stipulations that are currently to be used throughout the five resource areas.

- 2.7 A marked flaw in the document is the absence of resource area maps which generally depict where standard and special stipulations would be applied by alternative. Maps which show by alternative how areas will be stipulated are, in our view, one of the most important components of any management plan. A critical failure in determining how the oil and gas industry is impacted by alternative, maps which show by alternative how areas will be stipulated are, in our view, one of the most important components of any management plan. A critical failure in determining how the oil and gas industry is impacted by alternative, maps which show by alternative how areas will be stipulated are, in our view, one of the most important components of any management plan. A critical failure in determining how the oil and gas industry is impacted by alternative, maps which show by alternative how areas will be stipulated are, in our view, one of the most important components of any management plan.

- 1.8 The discussion of mitigation measures common to all alternatives on page 2-3 is representative of the concern we have regarding how oil and gas activities and stipulations will be portrayed in the document. The BLM expects that lease stipulations and permit conditions of approval are used to protect sensitive resources. Following the completion of a discussion of hypothetical effects on elk during a severe winter which would be attributed to oil and gas activities if they were not monitored and controlled by the BLM, this example is quite unnecessary. However, it implies that oil and gas activities would interfere the use of an entire winter range, thereby forcing elk to move to an adjacent winter range. Elk may move a short distance to avoid human activity, but the situation described by the BLM appears excessive and should be verified and documented in a study.

- 2.5.1 Appendix 8 contains assumptions for the Potential of Development which consist of average disturbances, projected number of wells and total acres disturbed. The appendix is a poor representation of the actual extent of disturbance. It is virtually impossible to follow the BLM's rationale and figures from one table to the next. While the problems extend throughout the entire appendix and involve the figures for each resource area, we have limited our comments to just a few examples.

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Project Manager
Bureau of Land Management

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First, Table B-1 shows by resource area the average disturbance in acres expected from drill-roads, roads, transmission lines and "miscellaneous uses". Obviously, this table is designed to show disturbances associated with individual well locations. However, it includes miscellaneous areas ranging from 100-250 acres, which leads the reader to conclude that an additional 100-250 acres would be disturbed over the life of the plan. This is not correct. According to Table B-4, these miscellaneous figures constitute the total additional disturbance expected over the life of the plan. This distinction must be made on Table B-1.

In another example, the narrative describing the potential for development in the GSA indicates that 54 wells would be drilled in the area over the next 20 years. Using the information in Table B-1, one would calculate that an average of 36.7 acres would be disturbed per year and a total of 884 acres would be disturbed over 20 years. Yet, Table B-4 indicates that a total of 78.8 acres would be disturbed each year (25 acres would be reclaimed, leaving 53.8 acres per year), and Table B-4 indicates that 838 acres would be disturbed over 20 years. Such discrepancies must either be eliminated or fully explained.

Further, the information on Table B-3 does not coincide with that shown on Table B-4. According to the information displayed in Table B-3, approximately 100,146 acres could be disturbed over a 20-year period. Yet Table B-4 indicates a total of 20,219 acres would be disturbed over 20 years. What are the reasons for these discrepancies? The BLM should verify, correct if necessary, or explain in greater detail how these figures were derived.

One last comment regarding Appendix B is that the maps and other information provided by each resource area should be standardized. One area presented its data in terms of square miles, while others provided similar data in acres. The potential maps are not consistent nor are the definitions of what constitutes high, medium, low or unknown potential. These types of inconsistencies make it extremely difficult to study the document.

Appendix D, Geophysical Operations, requires operators to perform Class III cultural resource inventories on all portions of seismic lines which cross BLM surface. This far exceeds the requirements of Section 106 of the National Historic Preservation Act. A Class III inventory is required only if there is a strong indication that sites within the area are eligible for inclusion in the National Register of Historic Places. The BLM has the duty to determine which areas are likely to contain eligible sites, not to arbitrarily require a Class III inventory on seismic lines crossing BLM surface.

Appendix E identifies lease stipulations which will be considered for application in accordance with the proposed action. In many cases, exception

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Mr. Robert W. Kline
Project Manager
Bureau of Land Management

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criteria are identified; however, in some cases they are not. While it is stated that areas where no exception criteria are identified might still be considered on a case-by-case basis, this statement should be more prominently displayed in the appendix to avoid possible future conflicts.

An exception criterion identified for several GSD stipulations in the GSA on page 1-3 would require operators to "enhance" drill rigs and other equipment. This requirement is excessive and virtually impossible to achieve. We recommend the word "enhance" be replaced with the word "reduce", which is more reasonable.

On page 6-8, both the GSA and GSD would impose a Controlled Surface Use stipulation for the protection of fragile soils. Several performance objectives are identified which are designed to ensure soil productivity. This stipulation is not necessary because fragile soils are adequately protected by standard terms and conditions of the lease. There is no need to overburden the lease with excessive restrictions.

One final comment is that BLMOS never received notification of the BLM's public meetings on the subject GDS. Since we were not informed of the meetings, we could not have representative attend. We are sure that the BLM's failure to notify BLMOS was an oversight. We would hope, however, that the BLM is not relying solely upon press releases to provide public notification of meetings. Meeting lists should be compiled and used to inform interested parties of future activities.

We appreciate this opportunity to provide you with our views and comments. If you have any questions or would like to discuss our comments in greater detail, please contact us.

Sincerely,

Alice Freil Benitez
Alice Freil Benitez
Public Lands Director

NWC
C/- Frank Selverowicz, Deputy State Director for Mineral Resources



Colorado Chapter of The Wildlife Society

5



August 15, 1990

Mr. Robert W. Kline, Project Manager
Bureau of Land Management
766 Harrison Drive
Grand Junction, CO 81506

Mr. Kline:

The Colorado Chapter of the Wildlife Society offers the following comments on the Draft Environmental Impact Statement for Colorado Oil and Gas Leasing dated April 1990.

We consider the stipulations for mitigating direct losses of wildlife habitat and values to be inadequate. Only the Blended Springs RA (p. 4-3) proposed stipulations requiring compensation for losses of crucial habitats. Why was this the only RA to do so? Certainly, there are crucial habitats in the remaining RA's that could be jeopardized by oil and gas development. Most lease stipulations (TL, NEQ, CMA, Appendix E) concern avoiding impacts of initial exploratory or development activity. However, when permanent development occurs and habitats are altered, only the GSD requires mitigating lost habitat or values. We believe the overall process addressing the compensation for wildlife losses needs to be more uniform across RA's. Mitigation strategies that would compensate for riparian habitats, threatened and endangered species, their habitats, and other wildlife sensitive and habitats should be broadly defined for all RA's. The actions proposed by the Blended Springs RA would serve as a good model from which to start.

There appear to be inconsistencies among RA's regarding lease restrictions pertaining to ungulate feeding/killing habitats. Rule deer, common to all RA's, are not listed by any RA as a species needing any protection during these critical periods. To restrict hunting restrictions pertaining to elk killing areas are in place for GSD, S/SPRA but not Krummhorn RA. Elk are common to all three RA's. We believe all ungulate species should be given equal protection during these critical periods and the inconsistencies among RA's in protecting ungulates should be eliminated.

At this time, the Colorado Chapter of the Wildlife Society feels the current draft EIS to be inadequate in presenting mitigation requirements for these situations where oil and gas development permanently affects wildlife crucial to wildlife.

Donald C. Freil
Donald C. Freil, President
P.O. Box 262
Dillon, CO 80439
303-726-3626



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

609 16TH STREET - SUITE 500
DENVER, COLORADO 80202-2405

AUG 14 1990

Re: SNW-EA

Mr. Robert W. Kline, Project Manager
Bureau of Land Management
164 Norton Drive
Grand Junction, Colorado 81506

Re: DEIS review for Oil and Gas Leasing & Draft Resource Management Plan, Blended Springs, Kremmling, Little Snake Resource Areas, the Northeast and San Juan/ San Miguel Planning areas

Dear Mr. Kline:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA), and Section 105 of the Clean Air Act, Region VIII of the Environmental Protection Agency (EPA) has completed its review of the Draft Environmental Impact Statement (DEIS) for the Colorado Oil and Gas Leasing and Draft Resource Management Plan for the above defined area.

In general, this document does good job of identifying the anticipated impacts associated with the proposed action. However, there are some areas of concern that need to be more fully addressed.

In particular, anticipated impacts to wildlife are not sufficiently documented. It is not so much that the EPA doubts the assertions concerning these impacts, but merely stating that no impacts are anticipated without supporting documentation of wildlife inventories or other relevant field data is inappropriate.

The methodology used to determine the claimed levels of impacts needs to be documented. Where inventories are to be conducted in the future under contracts related to a particular development site, as is the case with endangered species, such methodology also needs to be documented. Will state or federal wildlife agencies be involved in the evaluation of monitoring plans and the results of inventory activities? The EPA expects that, in cooperation with the above agencies, the BLM consider standardizing the methodology to be utilized in these areas in order to insure a unified approach and the gathering of consistent data.

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Reply to: 1950

Date: August 8, 1990

Mr. Robert Moore
8801 Bureau of Land Management
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80131-7076

Dear Mr. Moore:

The White River National Forest has reviewed the BLM Draft Environmental Impact Statement (DEIS) for Oil and Gas Leasing in Colorado, June 1990. The White River National Forest is in the process of defining the parameters and analysis which will be used in preparing our Forest-wide EIS for oil and gas leasing. Presently, the relationship between EIS of each agency have not been clearly defined. Consequently, decisions relative to our scope of analysis will be influenced by the scope of EIS of BLM. Because of this we believe it is important that various issues relating to cumulative impacts and determination of "significance" be addressed jointly by the BLM and the Forest Service.

We have concentrated our review of the DEIS on technical issues relative to the Krumm and Glenwood Springs Resource Areas. This decision is based on common administrative boundaries and what we believe to be the need to conduct cumulative impact analyses for broad ranging resource issues that extend beyond a single agency's boundaries (i.e., wildlife, transportation, air and water quality). We may also want to jointly quantify the level of significance through analyses of effects on these resources.

Our comments related to specific resource areas are enclosed.

Because of the importance of having compatible standards, guidelines, and stipulations for both FS and BLM, we believe a meeting to discuss our comments would best serve the public prior to the EIS preparing it's Final EIS.

Sincerely,

Frank Platt
THOMAS A. MOORE
Forest Supervisor

cc: BLM, Glenwood Springs Resource Area
cc: BLM, Krumm Resource Area

WHITE RIVER NATIONAL FOREST COMMENTS ON OIL AND GAS LEASING EIS

pg. 1-3 Relationship to BLM Plans and Program

The DEIS describes the steps involved in the plan amendment process (this EIS). The third step "Inventory" states that data necessary to make informed decisions was collected. Pg. 2-3 (2nd paragraph) states that "various resources and values within each Resource Planning Area are inventoried."

Clarification is needed as to what type of inventory was used in the analysis of impacts under each alternative and to develop mitigation measures. It appears that wildlife data used in the wildlife analysis consists of existing COM database information on elk, deer, bighorn sheep, raptors and selected gamebirds for which BLM maps are available. These species do not cover the range of habitat types which occur on EIS land. This level of inventory does not enable adequate disclosure of impacts on wildlife populations and their habitats. For all alternatives there is only one mechanism for requiring additional studies/inventories. Unfortunately, these are restricted by the laws of states which identify only "minor studies" and "minor-scale special studies". These may not be sufficient to develop adequate measures necessary to mitigate impacts to a level of insignificance for sensitive wildlife species or critical habitats discovered during the ADP process.

pg. 3-6 Taxation (2nd para.)

The DEIS states that "species that are listed as Threatened or Endangered under the Endangered Species Act" are protected. Candidate Species are not protected under the Endangered Species Act but "it is BLM policy to protect them the same as listed species." Federal Candidate and state listed sensitive plants are not protected by Federal and State statutes. Since BLM has not conducted an inventory which defines locations for these species and no special stipulations are provided in Appendix 4 to protect unknown sites, BLM should state how it proposes to afford these plant populations protection from development.

Relocation up to 200 meters after the lease is issued may not be adequate to protect populations of Candidate and sensitive populations from local participation. Will BLM require "minor inventory", by a qualified biologist at the time of year these species can be identified, during the site-specific environmental analysis phase for ADP under all leases? If not, BLM should state how it will provide protection under this "policy".

Comments are provided only for the Glenwood Springs and Krumm Resource Areas due to their interface with the White River National Forest and potential cumulative impacts to wildlife from Oil and Gas Development on public, split-estate and privately owned lands with mineral rights (adjacent to public lands).

pg. 3-4 Glenwood Springs Resource Area

The DEIS identifies the mountain shrub community, comprised of primarily oak brush and serviceberry, as a very important source of food and cover for many species of wildlife, including songbird species. This vegetative type consists of 20% of the Glenwood Springs Resource Area.

The DEIS states "This habitat type is currently being lost to housing development."

Although this habitat is described in Chapter 3 under Affected Environment, further loss of this habitat from Oil and Gas Development on dependent wildlife species is not analyzed for any of the alternatives or under cumulative impacts in Chapter 4 under Environmental Consequences. This is a deficiency that should be addressed in FEIS.

The same comment is relevant to the conifer vegetative community and aspen and riparian habitat types. The conifer vegetative habitat type is described in the DEIS as providing "very important winter shelter and hiding cover and food for many wildlife species". Furthermore, the DEIS describes existing alterations of this habitat which are occurring as the result of fuel wood cutting, timber harvesting, plant health infestation and urban development. The potential added impact from oil and gas leasing should be addressed for the alternatives and under the cumulative impact section in Chapter 4.

Aspen stands and riparian-related species such as cottonwood, willow grove and forbs are as the DEIS describes "small but significant vegetative type" used by 75% of the wildlife species some time during their life cycle. If these vegetative communities are so valuable for wildlife, the DEIS should analyze potential impacts from Oil and Gas Leasing in Chapter 4, develop impacts from other existing uses (road building, construction, gravel extraction, water diversion and livestock grazing) should be analyzed under "Cumulative Impact" in Chapter 4. Grazing has had a significant adverse impact on these habitats in the GSPA, and this information should be used to assess cumulative impacts to wildlife from additional losses due to oil and gas leasing.

In addition, varied locations are not identified in the DEIS for the Glenwood Springs Resource Area. How will these habitats be protected by BLM and how will 404 (b) (1) provisions under the Clean Water Act address? These issues, as well as, the previously identified issues should be addressed as the Glenwood Springs Resource Area will potentially be integrated into the White River cumulative impact analysis for wildlife in the planned Oil and Gas EIS.

pg. 3-4 Krumm Resource Area

Information from this area will also be an important component of the White River's ability to identify and mitigate for cumulative impacts to wildlife under the planned Oil and Gas EIS.

pg. 3-6 (1st para.)

Clarification is needed on definition of "irrigated meadow" which is one of the four major vegetation types described (130) in the Krumm Resource Area. Please state whether these meadows are considered wetlands and if so by what agency.

pg. 3-6 (2nd paragraph) The DEIS describes "the mountain shrub community which constitutes only 1% of the total vegetative cover in this Resource Area" as a vegetative community of "special note". The DEIS further states that "despite its highly restricted distribution, it is one of the vital life and riparian types in terms of nutrient and cover value for wildlife and livestock". If so, the potential loss of this vegetation type should be addressed in Chapter 4. Specifically for this Resource Area or under Cumulative Impacts on Oil and Gas development would have a significant impact on wildlife dependent species.

63 Recommend that a "No Surface Occupancy" stipulation be used to mitigate potential significant impacts resulting from loss of this limited habitat. This recommendation is also relevant to riparian vegetation which is also not protected under any of the Alternatives.

pg. 3-12 Wildlife

(last paragraph) The DEIS states that for "terrestrial wildlife, BLM emphasizes habitat management determined by legal status (RIP species) or commercial value for species of special interest to federal and state agencies". First, if BLM is following habitat management based status on legal status; riparian and wetland areas, which are afforded protection under the Clean Water Act, should be emphasized. Secondly, the "commercial value" for species of interest to federal and state agencies can be interpreted to mean both game and nongame species of wildlife. Not only will maintenance of biological diversity be a key issue in the upcoming revision of Forest Plans nationwide, but there is an economic "value" associated to nongame species of wildlife (birdwatching, 2007/8 "Watchable Wildlife" "Taking Wing" Programs, etc.). Under this interpretation the scope of BLM's analysis for this EIS is inadequate under NEPA as it only accounts for riparian species (deer, elk, sage grouse) and a few federal threatened and endangered species. The discrepancy between BLM's scope for this EIS and the Forest Planning process is that the Forest Service have the ability to determine cumulative impacts to Management Indicator and other sensitive species which have been identified for analysis in the upcoming NEPA OIL and Gas Lease EIS.

pg. 3-12 Glenwood Springs Resource Area

(Columbia River and R13) The DEIS describes how winter range, severe winter range, and crucial habitats across have been reduced in the past two years and given protection from additional development of private lands. Oil and gas leasing on R13 lands and potential significant impacts, due to the loss of additional habitat, should be addressed in the DEIS.

pg. 3-13 Grand Staircase-Escalante and Sevens

The DEIS describes "critical habitats required by sage grouse, waterfowl, and raptors. Only documented critical habitats for sage grouse and some raptors (R13) are protected from special stipulations. Due to the data gaps for these sensitive species, how will new critical habitats discovered during the site-specific environmental analysis process require for APDs be protected? After reviewing the special stipulations requirements it is obvious that timing restrictions of 90 days or less and relocation limitations of 200 meters or less are inadequate to protect these species not designated as federally listed threatened or endangered. Will discovery of a sage grouse strutting lek during the APD field review trigger an amendment to the EIS? Due to the time and cost involved in amending an existing EIS, it does not seem likely. The conclusion can be drawn that realistically known critical habitats for these species will not be protected as discussed throughout the DEIS.

pg. 3-11 Riparian and Wetland Habitat

It is unclear how BLM is planning to protect instream habitat for A and E populations of Colorado River cutthroat trout when development is not restricted in these watersheds as in the riparian zones. (3)

The EIS should state how additional adverse impacts to riparian fish and gas leasing and development will effect riparian habitat and function for wildlife, water quality, and special stabilization. This issue should be addressed in the DEIS under specific Resource Area impacts or in the Cumulative Impact section.

In addition, does the definition of "riparian community" include wetlands? If so, should No Surface Occupancy stipulation § 1 for the Krumming Resource Area only protect wetlands for wetlands? And should the DEIS describe "approximately 80% of all wildlife species known to inhabit the region are either totally dependent on riparian communities or utilize them more than other habitats". Recommend there be a No Surface Occupancy stipulation for riparian because this type of mitigation is lacking in the DEIS, and any disturbance or further loss of riparian habitat (which only comprises 1% of the total vegetative community) will have a significant adverse impact. Further this impact on the degree of impact have been identified, addressed, or mitigated for in the DEIS.

3-30 Soils

(last para.)

The DEIS states that "several potential prime farmland sites exist within the Study Area". These soils exhibit very high soil productivity potential and are eligible for special designation and protection. Special stipulations on surface-disturbing activities should be used to prevent any unnecessary disturbance." Recommend special stipulation be provided for protection of riparian habitat.

pg. 3-3a Waters

(last para.)

The DEIS states that "several critical watersheds are within the Glenwood Springs Resource Area". These are critical watersheds for the cities of Rifle and Hot Wells and a flood hazard area around Glenwood Springs. Special stipulations have been provided on how to prevent any surface disturbing activity.

Other critical watersheds can be identified based on known highly erodible soils or the occurrence of A and E populations of Colorado River cutthroat trout. Water quality protection is critical to both fish populations which occur in highly suitable watersheds and Colorado cutthroat trout. The CDOU list of Species of Special Concern includes three species of fish and one genus which could be adversely impacted by oil and gas leasing in suitable watersheds. In addition, Colorado cutthroat trout are a federal candidate species. It is potentially one to two years away from formal listing due its continued decline throughout its range. Although the DEIS does not discuss the impacts of oil and gas leasing, both Federal Candidate and State listed Sensitive species; there is no mechanism for doing so. Recommend that BLM protect highly suitable watershed containing fish populations and Colorado cutthroat A and E strains through the placement of No Surface Occupancy stipulations on these "critical watersheds".

pg. 3-3a through 3-3d: Forestry, Recreation and Livestock Grazing

The DEIS identifies current uses of R13 land, yet fails to analyze cumulative effects to wildlife and other resources resulting from additional impacts associated with oil and gas leasing and development. (5)

Recommend that a No Surface Occupancy stipulation be provided for all watersheds where A and E populations occur. This information is available on a 1:24,000 scale from CDOU. The basis for this recommendation is the potential for water quality and instream habitat deterioration due to sediment and the large quantities of water required during the Exploratory Drilling phase of development (see Appendix 1, last paragraph).

g-3-1 Krumming Resource Area

The DEIS describes the Krumming Resource Area as providing "habitat for approximately 310 species of animal", including 220 birds, 65 mammals, 20 fish, seven amphibians, one reptile and 3 domestic herbivores". Yet, the DEIS only describes critical habitats for BLM, upland game birds, waterfowl, and raptors. Although the CDOU has identified public lands within the Krumming Resource Area as crucial habitat for greater sandhill cranes, potential impacts from oil and gas leasing on this habitat is not addressed in Chapter 4 under this Resource Area analysis or for cumulative impacts. With R13 emphasis on only four wildlife species groups within this Resource Area, analysis of potentially significant adverse impacts to more localized rare species cannot be addressed. This lack of information on less common species, potentially dependent on habitat which may be limiting factors (mammals birds and riparian) which both comprise less than 1% of the total vegetative community (the Krumming Area) can lead to local extirpation of populations. As conservation/maintenance of populations is dependent on genetic diversity existing to population numbers, adverse impacts from oil and gas leasing and development in these two habitat types could be significant.

pg. 3-3a (last para.)

Federal Candidate species which occur within the Krumming Resource Area include Colorado cutthroat trout, forest western roach, white faced blue, and ferruginous hawk. BLM should state how it will protect potential habitat for these species. There is no mechanism to protect their habitats if discovered during the APD review process. Relocation of a well pad up to 200 meters may not be adequate especially if there is no mechanism for relocating roads and associated pipelines, etc. How will the BLM and White River National Forest analyze and mitigate potential cumulative impacts to these species and their habitats without adequate protection provided by BLM?

pg. 3-25 (last para.)

The DEIS states that "more sage grouse nesting activity takes place within two miles of existing roads, making such areas highly important to sage grouse reproduction". No Surface Occupancy stipulation § 1 for protection of breeding habitat only includes a one-quarter mile buffer zone around the lek (strutting grounds) when nesting activity takes place within two miles of strutting grounds". How does this stipulation protect sage grouse populations?

pg. 3-35 Riparian/Wetland/Floodplain

(last para.)

The DEIS states that "riparian communities, although limited in quantity and quality, provide habitat for a large number of wildlife species and represent a highly important resource within the Resource Area". The DEIS needs to clarify why the "quality" of the riparian vegetation community is "limited". It is due to grazing, water diversions, etc? (4)

Also applicable is the Transportation issue which has also not been addressed to sufficient detail to analyze short and long-term impacts to BLM managed lands.

An oversight in Chapter 3 is the lack of identification of caves as an issue. Potential for significant adverse impacts to this habitat type is extremely high from all phases of oil and gas development. In addition, caves are critical habitat for both Federal Candidate and State listed Species of Special Concern (Bats), so well as providing habitat for endemic species of invertebrates. An analysis of potential impacts from oil and gas leasing should be included and a special stipulation requiring No Surface Occupancy buffer zones established.

Chapter 4: Environmental Consequences

pg. 4-1 Vegetation

(last para.)

The DEIS identifies the maximum amount of vegetation that could be lost over 20 years from oil and gas leasing as 19,000 acres. The DEIS concludes that "this is not considered to be a significant cumulative impact". The basis of this conclusion is questionable when information on proportional impacts to the various vegetation communities is lacking. If for example 50% of the impacts occur in riparian habitat (1,900 acres), then cumulative adverse impacts to riparian would be significant. In addition, a cumulative analysis or required under NEPA, should look at additive impacts to vegetation from all past, present, and foreseeable future development. The DEIS does not discuss this EIS. It is also questionable whether BLM's cumulative analysis should include indirect impacts and opportunities for mitigation.

It seems that prior to reaching a conclusion on "significance", an analysis of cumulative impacts for all land uses on a per vegetative community types for both adjacent private, public-entire, and federal lands should be analyzed. With the information presented, it is not possible to reach a conclusion.

pg. 4-1 (last paragraph)

The DEIS states that "impacts to riparian and wetland habitats would not be significant." This conclusion is based on evidence of development in these critical areas through the use of Conditions of Approval (COAs) during predrill exploration. This type of development will site treatment up to 300 meters to avoid construction in riparian and wetlands. This conclusion that impacts would not be significant is without basis. Large wetlands, wet meadow, and lower elevation areas of timber habitat, to provide a few examples, would not withstand the impacts of oil and gas leasing. In addition, the DEIS does not show road construction be conditioned to prevent riparian and wetland communities when filling of these areas may be required to reach pad sites. It is in compliance with BLM's own BLM Manual that the BLM Act and Federal Executive Orders which provide direction to BLM for protection of floodplains, etc.?

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pg.4-1 Wetlands

(1st par.) The DEIS states that "to comply with requirements of the Endangered Species Act, all oil and gas activities would be cleared for species occurrence at the operational scope on a near-by/basin basis rather than at the leasing stage." This appears to contradict the statements made on page 1-3 (2nd paragraph) that "This EIS will serve as the Biological Assessment when the Final EIS is published. The U.S. Fish and Wildlife Service will issue a Final Biological Opinion on the effects of Proposed Action on Threatened and Endangered species." How can the U.S. Fish and Wildlife Service issue a Final Biological Opinion when Threatened and Endangered species occurrence within a lease area is unknown. In addition, if the Final Biological Opinion is issued when the EIS is published, will the U.S. Fish and Wildlife Service do an additional Consultation under Section 7 of the Endangered Species Act on individual leases where this species occur? Please clarify.

On page 4-1 (1st paragraph) The DEIS further concludes that "It has been determined through analysis that the Proposed Action Alternative will not have an effect on any of the Threatened or Endangered species found in the Study Area." Considering the gaps in the biological data and the unclear direction in the DEIS relative to the Endangered Species Act, please state what this conclusion was based from.

4-2 Livestock Grazing Proposed Action Alternative

(1st par.) The DEIS states that "within activities utilizing explosive charges, bumper, etc. could damage normal water aquifers, altering subsurface water flows if the activities are within close proximity of springs. This could result in reduced flow or even the loss of all water to existing springs and water wells." These activities have the potential to dry up springs resulting in the loss of important wildlife watering areas and habitat resulting drying up of adjacent wetlands. Yet no analysis of impacts to these habitats and the effect on wildlife or mitigation is provided in the DEIS.

pg.4-3 Wildlife

(2nd par.) The DEIS describes how the direct loss of habitat "as a result of surface disturbance of 19,200 acres within the 30 mile radius" would be "offset" by itself be a significant impact to wildlife within the study area. If the majority of loss occurred in Mountain black habitat within the Cleoneed Springs and Kromming Resource Areas or in riparian communities (including Aspen), then impacts to wildlife may be significant. Please state what techniques were used and how this information was analyzed to draw such a conclusion.

(3rd par.) Displacement from critical habitats is the most severe impact to wildlife resulting from oil and gas leasing and associated development of the leases. For example, oil can be displaced from 1/4 to 1/2 mile from the area of disturbance. If this occurs during a critical period (winter, calving season), impacts could be greater than the loss of habitat resulting in direct loss of vegetation. Although special stipulations have been developed for a few game species, the majority of wildlife within the Study Area and State listed Sensitive and Species of Special Concern, remain without any analysis or mitigation from the effects of displacement. Displacement distance and direct habitat loss have not been added into analyzing adverse impacts to a particular wildlife species. Conclusions in the DEIS relative to significance have the potential to be no longer valid.

(7)

Therefore, the statement "No significant impacts to any Threatened, Endangered or Sensitive species are predicted under any of the alternatives" is not valid. There remains inadequate protection for Federal Candidates and State listed "Sensitive Species".

pg.4-4 Consideration of Forest Management Alternative

(3rd par.) The DEIS states that "if disturbance to aquatic and riparian areas, resulting in minor losses of both fish and wildlife habitat" would remain unmitigated under this alternative. This language used in the DEIS do not support the conclusion that "minor losses" would occur.

pg.4-5 Standard Terms and Conditions Alternative

(1st par.) The DEIS states that "Wildlife habitat would be protected from disturbance under the standard lease terms by specific conditions applied to oil and gas activities within the right-of-way, and seismic activities of leasehold at the time of permit application." The ability to place protective measures on wildlife habitat where it is found is severely limited. Please explain how OGA would be used to require that roads and roads not be allowed in large wetland habitats (i.e., wet meadows, riparian areas, etc.).

pg.4-7 Conclusions

Conclusions reached in the summary section for Chapter 4 are not supported by the analysis and information presented in the DEIS. General statements are made regarding wildlife yet only impacts to a few species in a narrow range of vegetative communities from oil and gas leasing were analyzed. The maintenance of biological diversity within five Resource Areas was not considered.

Statements such as "because most of these species recover quickly from disturbance, impacts would be short-term and would not affect the long-term productivity of the species" appear to exclude habitats where cumulative impacts may already be limiting productivity are obscure and not supported by data and analysis. Define "these species". Where are the "critical habitats" where cumulative impacts may already be limiting productivity? This information is not provided in the DEIS.

It is also unclear how measures such as "a field inspection by a qualified individual, of every ADP and seismic location" will mitigate for impacts to currently unknown riparian areas where a road location can only be moved up to 200 meters and a 1/4 mile buffer zone around a road would be required for protection. It is questionable that a visual inspection of up to 60 days will be adequate that still allows for activities relating to "operation and maintenance" for all major leasing activity.

Cumulative Impacts/Chapter 4

The cumulative impact section should be expanded upon. BIA has limited the scope of the EIS to cumulative impacts on 300 lands and to impacts associated with oil and gas leasing. With regard to wildlife, limiting the scope of the EIS to selected game and fish species does not meet the requirements of NEPA for full disclosure of effects to wildlife resources and their habitats from oil and gas leasing.

(9)

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pg.4-3 Wetlands

(3rd par.) The DEIS describes significant impacts to big game which will result from field development and production due to loss of habitat and disturbance during the critical winter period. In addition due to the intensity of field development and production of a given area critical habitat could be disturbed. This is significant due to these habitats being at or above carrying capacity with no alternative habitats available.

The timing limitation stipulation relative to big game allows for "operation and maintenance" of production facilities. What does this mean? Capability for recirculating a well? Once a week vehicular traffic in this area? This needs to be clarified and allowable activities, equipment and frequency of occurrence for "operation and maintenance" specifically defined in relevant special stipulations. The loss of critical habitats, significant reductions in these populations could occur.

pg.4-4 (1st par.)

Following the rationale as described in the DEIS, the reduction of big game and damage from oil and gas development cannot be mitigated through compensatory off-site habitat enhancement. This is due to a slow regeneration time of 15 to 30 years.

pg.4-4 (2nd par.)

The DEIS states that "reduction in the quantity and quality of Mountain Lion and Black Bear habitat would occur as a result of these actions under the Proposed Alternative." Movement to certain forage areas can result in large concentrations of black bear during the late summer and fall seasons. Documentations of sublethal and nonlethal effects are important for black bears prior to entering their hibernation period. Nutrition is also key to reproductive success of this species.

As this type of habitat may be a limiting factor to black bear populations in the Kromming (1st of critical habitat) and Cleoneed Springs (2nd) Resource Areas, cumulative adverse impacts due to loss of habitat and displacement during the late summer-fall period may be significant.

pg.4-5 Aquatic/Endangered/Riparian Habitats

The DEIS states that potentially significant impacts to these habitats "would be minimized by limiting surface-water activities within 500 feet of riparian wetland zones." If this is a mitigation measure, explain why there is no No Surface Disposal or other measures to be used in the DEIS to protect these habitats. Since a complete inventory of these critical wildlife habitats has not been conducted, explain how these areas will be protected from road and other associated construction-related impacts due to development of oil and gas leases.

pg.4-5 Threatened and Endangered Species and Species of High Federal Interest

The DEIS states that "all leases contain the protection for Threatened and Endangered species." Threatened and Endangered species are protected under the Endangered Species Act and with the U.S. Army Corps of Engineers for potential impacts to riparian and wetlands under Section 404 of the Clean Water Act and to be included.

"Species of High Federal Interest" are protected either with stipulations in the "Clean Water Act" or under the "Antiquities Act". The stipulations provided in the DEIS do not protect all of the Federal Candidate species. Hence, OGA identified in the DEIS may or may not protect these same species when occurrence in a lease site is determined at the ADP stage.

(8)

Chapter 5

The records of coordination with the U.S. Fish and Wildlife Service under the Endangered Species Act and with the U.S. Army Corps of Engineers for potential impacts to riparian and wetlands under Section 404 of the Clean Water Act need to be included.

Appendix A

Geological Exploration can be considered a "nonmarket activity" under NEPA and potential impacts to BIA resources should be analyzed under this EIS.

pg.4-4 (1st par.)

The DEIS states that "Five thousand to 15,000 gallons of water may be used for drilling mud, cleaning equipment, cooling engines, etc. A surface water source may be used for a stream or a well, or the water may be trucked to the site from yards or streams in the area." As this statement follows the preceding paragraph which states construction of a well was not, it is assumed that this water was figure is for each well.

The DEIS does not have adequate analysis of impacts to riparian, wetlands, and aquatic habitats from use of this large quantity of water. Consequently, adverse impacts to fish and wildlife were also not analyzed. These types of potential adverse impacts to many critical resources may be significant. This needs to be addressed in Chapter 4 by Resource Area and under Cumulative Impacts.

Appendix A

NEPA stipulations should be revised to include the word "known" after the words "Protection of" as these stipulations will not protect unknown populations or habitats discovered during the ADP field review.

pg.4-5 (1st column) A stipulation affording protection to riparian and wetland areas should be included. (second column) Why are only wetlands protected by a stipulation?

pg.4-4 Stipulations to protect riparian and wetlands for these Resource Areas should be included.

pg.4-6 Timing limitation stipulations presented on pages E-6 and E-7 should be revised to include the word "known" before the words "Water Habitat, Critical Riparian Areas, and Wetlands".

pg.4-7 Controlled Surface Use Stipulations The DEIS states that "The GSP stipulation is less restrictive than the HSG or HSG stipulations, which prohibit all occupancy and use of all or portions of a lease for all or portions of a year." This statement is not true as the T-1 stipulation allows for operation and maintenance within critical time periods.

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United States Department of the Interior

NATIONAL PARK SERVICE

ROCKY MOUNTAIN REGIONAL OFFICE

1780 W. Alameda Parkway

P.O. Box 25253

Denver, Colorado 80225-0253

NO BUREAU REPLY

17619 (RMR-PP)

AUG 14 1990

Memorandum

TO: Mattie Mae, Grand Junction District, Bureau of Land Management, Grand Junction, Colorado
Attention: Robert W. Klein, Project Manager

FROM: Associate Regional Director, Planning and Resource Preservation, Rocky Mountain Region

SUBJECT: Review of Colorado Oil and Gas Leasing and Development Environmental Impact Statement (DPS 90/0011)

The National Park Service (NPS) has reviewed the above referenced document and offers the following comments:

Management of the five Bureau of Land Management (BLM) Resource Areas or Planning Areas is of concern to the NPS because oil and gas development activities permitted on these lands have the potential to impact four NPS units: Mesa Verde National Park, Hovenweep National Monument, Dinosaur National Monument, and Rocky Mountain National Park, and other areas of NPS administration including Wild and Scenic Rivers and National Natural Landmarks.

It is our belief that the intent of the Federal Land Policy and Management Act and the nationwide agreement between our two Agencies requires impacts to surrounding lands be analyzed. We also believe that a complete discussion of how current and projected oil and gas development on BLM lands near NPS-administered lands might impact significant resources is required by the Council on Environmental Quality (CEQ) regulations at 40 CFR 1502.16 (e).

We are encouraging to see a move in the direction outlined in this document regarding BLM oil and gas leasing policies. We are certainly in favor of any additional provisions that can be built into the leasing process to bring it into full compliance with the National Environmental Policy Act. We are concerned, however, that this document does not fully evaluate the impacts of leasing and development.

210 We note the document references several of the above listed streams but we were unable to identify the impacts that oil and gas developments would have on these streams and their outstandingly remarkable values.

We have enclosed a copy of the procedures that Federal Agencies should follow in assessing the impacts of their actions on NPS streams.

National Natural Landmarks

219 We have also enclosed a list of designated and proposed National Natural Landmarks (NNL) for the State of Colorado. Many of these NNL are located in or near potential lease areas. Because of their significance and because Federal Agencies are responsible for considering impacts to NNL under Section 102 (2) (c) of the National Environmental Policy Act, we would appreciate consideration for these resources.

Dinosaur National Monument

218 The document notes that areas adjacent to Dinosaur National Monument are rated as having low potential for development. Given that this rating is the lowest potential identified in the Little Snake Resource Area and given further the low number of exploratory wells projected in this rating area, closure of the area adjacent to the park should have minimal impact on potential production of oil and gas from the Resource Area as a whole. The potential impacts to park resources and resource values far outweigh this low potential for oil and gas development.

Mesa Verde National Park

120 Mesa Verde National Park is designated as a class I area under the Clean Air Act of 1970, as amended. The DHEI lists the visual air quality of the NPS lands along the border of the park as "Very Good Class II." The NPS (visual resource management) classes as listed, even though explained, are confusing. They could be read as Air Quality Act designations. This is confusing to us and likely conflicting to the general public.

SPECIFIC COMMENTS

121 1) There are several maps included in the document, but only a very few identify NPS units or other areas of NPS concern. We recommend that these areas be included in all appropriate maps in the final EIS.

2 2) Pages 2-1, 2, and 2-4. We recommend that the last two sentences be deleted since the issue of protective leasing is not resolved, and we believe that more detail would be needed to adequately explain the complexities of the lease.

30 3) Pages 2-3, 2, The text explaining Table 2-3 should clearly state that Federal Lands not available for leasing, such as lands within NPS units, are not included in the table.

31 4) Pages 2-3 and 2-4. We note from Tables 2-3 and 2-4 that the proposed action would result in fewer restrictions on fewer areas in the Little Snake Resource Area than would the "No Action" alternative. We were not able to determine on

GENERAL COMMENTS

Air Quality

159 The air quality analysis in the Draft Environmental Impact Statement (DEIS) is inadequate. Individual oil wells can be major sources of air pollution, generating more than 150 tons per year of one or more regulated pollutants such as sulfur dioxide, hydrogen sulfide, nitrogen oxides, volatile organic compounds, and carbon monoxide. Hydrogen sulfide and volatile organic compounds combine in sunlight to form smog. The preferred alternative projects the opening of as many as 47 new oil fields and up to 1,189 new oil wells in the study area. The DEIS concludes that this development would have "very minor, short-term, and very localized" impacts on air quality. There is no mention of control technology to reduce the emissions of air pollutants, nor is there any mitigating measure or requirement to use that technology.

Since some or many of the 1,189 wells may be developed near class I or II, or category I or II areas, the final EIS should include an analysis of the potential air pollution impacts on these areas and their resources, as well as required control technology that will reduce the air pollution impacts. Mitigation measures that clearly describe the application of appropriate air pollution control technology should also be included in the final EIS.

Wild and Scenic Rivers

The study area includes all or portions of five streams that are listed on the Nationwide Rivers Inventory (NRI). They are:

- The Arkare River from the Sabra/Kansas state line to Alder Creek. Listed for its outstandingly remarkable fish, wildlife, historic, and cultural values;
- The Colorado River from State Bridge to Blue River. Listed for its outstandingly remarkable scenic, recreational, geologic, and fish values;
- The North and South Forks of the White River. Listed for their outstandingly remarkable scenic, recreational, fish, and wildlife values;
- The Yampa River from the Little Snake River to Williams Park. Listed for its outstandingly remarkable scenic, recreational, geologic, fish, wildlife, and cultural values;
- The Animas River from Animas City to Mineral Creek. Listed for its outstandingly remarkable scenic, recreational, geologic, fish, wildlife and historic values.

In addition, the Crystal River (including its North and South Forks) from the national forest boundary to the eastern end of the North and South Forks is listed on the NRI in your study area. However, there appear to be no NPS lands along this NRI segment.

which lands exploration and development would be less constrained. Some further explanation is warranted in the final document.

36 3) Page 2-4. Table 2-4 indicates that all the alternatives evaluated are clustered in the middle of the spectrum. We would like to see additional stipulations that provide for increased protection in the areas of visual and air quality.

123 5) Page 2-5. Map 2-2 incorrectly delineates the boundary of Rocky Mountain National Park. The map shows the pre-1980 boundary.

86 6) Page 2-9. Table 2-6 should be amended. Bare plant invasions in Dinosaur National Monument have identified nearly 40 species of special concern, which are Federal candidate species. In addition to the species listed in Table 2-6, include park producers (*Arabis stricta*) and alpine bog orchids (*Silene acaulis*).

86 7) Some other Category 1 and 2 species may occur in the Little Snake Resource Area, such as notably listed species orchid (*Spiranthes ciliolata*) and rock hysanths (*Phymosia lepidula*).

107 8) Page 2-10. Table 3-6 fails to include the peregrine falcon (*Falco peregrinus*). There is at least one documented site which has been occupied since 1980. This information should also be included in the discussion of threatened and endangered species on page 3-26.

98 9) Page 3-25. This section, Affected Environment, does not mention other small species which may be rare or sensitive. One such species is the spotted bat (*Myotisotis maculatus*). These status is largely unknown. The only known records of this species in Colorado are in and near Dinosaur National Monument.

108 10) Page 3-16. In the discussion of the bald eagle (*Haliaeetus leucocephalus*), the document should note that significant roosts occur in Lily Park on RM, BLM, and private lands.

109 11) Page 3-26. The discussion on endangered fish should be expanded to reflect the proposed listing of the redband cutthroat (*Oxyrinchus notatus*) as endangered. The humpback chub (*Osteichthys*) has been reported in Cross Mountain Canyon and in the lower reaches of the Little Snake River. We suggest that the Colorado Division of Wildlife (Tom Swales) and the Fish and Wildlife Service (Dr. Harold Tyus, 801/789-0754) be contacted to acquire the most recent information on the location and status of the endangered fishes.

114 12) Page 3-29. The discussion on threatened and endangered species mentions only vertebrates. There is no reference to threatened and endangered plants or invertebrate species or the status of respective candidate species. Of specific concern are several candidate plant species that may be found in the higher and more mountain areas near Mesa Verde National Park. Species that should be included include:

- Mesa Verde false forget-me-not (*Asclepias speciosa*)
- Monardella willowii (*Asclepias speciosa*)
- Small flowered penstemon (*Penstemon parryi* Rose)
- Spotted Mesa columbine (*Spigelia alternata* Moussem)

There are just four of an extensive list of plant species that should be surveyed prior to any road status change. I listed them in the table.

13) Page 3-29. The document notes that the "Mexican spotted owl has been reported in Mesa Verde." The spotted owl (*Nyctala mexicanus*) has been found within Mesa Verde National Park by the Forest Service during 2 Spotted Owl Survey Team. With this confirmed observation of spotted owl within the park, there is the possibility that the spotted owl may also be found on Weber and Henneke Mountains. Justification exists for a formal survey of the Weber and Henneke Mountains Wilderness Study Area (WSA) as spotted owl habitat.

14) Page 3-40. This page notes that the Timpas River constitutes a sensitive visual resource. It is recommended regarding this section to note that Dinosaurs National Monument and adjacent lands are also quite sensitive and vulnerable to degradation of visual resources and values. Oil and gas development adjacent to the Dinosaurs National Monument could severely diminish the value of view from the park.

15) Page 3-43. We recommend that the Hennekes Cooperative Management Plan be added to the Class II WNM listing, and that the Mesa Verde rta be moved to the Class I WNM listing.

16) Page 3-45. The cultural resources addressed in this section are specific to sites that are listed on the National Register of Historic Places. The four separate cultural sites located in the Colorado portion of Hennekes National Monument were not included in the list provided. In fact, the existence of the park was not addressed in the cultural resources section at all. Except for the passing reference to the surface geology (NSD) made in Table A-1 on page 4-21, the existence and location of Hennekes sites within Colorado were not addressed.

17) Page 3-49. Table 3-11 notes that several WSA are recommended as non-suitable for wilderness designation. A change in action away from the current WSA management could allow for oil and gas development and impact the resources or values of nearby WSA units. We do not believe that the document provides the rationale for these recommendations and we question their validity.

18) Page 3-53. The map locations of Weber and Henneke Mountains have been reversed.

19) Page 3-63. The Area of Critical Environmental Concern (ACEC) located on map 3-10 should be extended eastward to include the North Rte escarpment south of Mesa Verde National Park.

20) Page 4-2. This page states that "It has been determined through analysis that the proposed action will not have an effect on any of the threatened or endangered species found in the study area." This statement may be incorrect since inventories for the study area are incomplete and the document after states on page 3-7 that protection of endangered, threatened, and sensitive plants would only be "to the extent such protection does not unduly hinder or

field development or require additional mitigation if actions from a discovery well indicate that the air quality at WPA units would be degraded by full field development and production. Similar provisions should be made for other resources.

25) Page 6-7. We are concerned that the Conditions of Approval related to endangered, threatened, and sensitive species (notably plants) and other resources (notably raptors and sandhill crane nests) provide for protection and/or mitigation only to the extent that such protection and/or mitigation does not unduly hinder or preclude existing development rights. It would seem incumbent on the BLM, by law, to impose whatever restrictions are necessary to ensure that threatened and endangered species and their habitats are not adversely impacted by exploration and/or development, even if these activities are proceeding pursuant to an existing lease.

26) Page 6-7. We recommend that the Conditions of Approval regarding pipelines be amended to include requirements for automatic shut-off valves, double wall pipe, and response teams in each instance a pipeline crosses the Timpas River or any other stream where spills have the potential to impact endangered fishes. There are certain coarctates, both inside and outside the park, which are often very vulnerable to alien substances such as petroleum, petroleum products, and other chemicals used in oil and gas drilling.

The Amoco oil spill in the Timpas River adequately demonstrated the potential for significant impacts, even from a relatively small spill. That particular case, the pipe was single wall, there were no automatic shut-off valves, and the response team had neither the expertise nor equipment to effectively contain the spill in a ravine environment. Containment efforts were totally insufficient. Any of the suggested environmental safety requirements could have prevented or at least minimized the ecological damage to the Timpas and its resources.

27) Page 6-5. We support the on surface occupancy stipulation for the Hennekes Cooperative Management Strategy area. This stipulation should also include the Goodwin Point and Outcreek Cactus resources protection zone areas.

28) Page 6-1. Table L-1 should be updated to include the results of the 1987-1989 surveys conducted by the Colorado Natural Areas Program in and near Dinosaurs National Monument. A copy of the summary table that results are enclosed.

We appreciate the opportunity to comment on this document and wish to review more detailed action plans as they become available. If you have any questions on our comments, please contact Richard Dow, Division of Planning and Compliance at PWS 337-2030 or commercial (303) 869-1320.

Richard A. Stratt

Enclosures

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STATE OF COLORADO DEPT. OF NATURAL RESOURCES

HAROLD J. RABIN III, Executive Director

1313 Sherman St., Room 714, Denver, Colorado 80202 (303) 244-3311

August 17, 1990

800 Kille
Bureau of Land Management
764 Horizon Drive
Grand Junction, CO 81505

Dear Mr. Kille:

Colorado State agencies have completed their review of the D11 and the existing Draft EIS. This letter and the accompanying documents constitute the state's comments on the draft environmental report.

In general we support specific lease stipulations, guidelines and monitoring in areas which have important, unique or especially sensitive natural values. While the Surface Occupancy stipulation is a direct impact on such parcels, it is important to evaluate the potential for impacts caused by nearby drilling, production and transportation. Given new technologies such as horizontal drilling, such monitoring and evaluation is critical. While we do not believe that an EIS should accompany such lease, these off-site impacts should be evaluated in a site-specific basis during subsequent stages of the approval process.

We recommend that the Final EIS acknowledge and evaluate potential "off-site" impacts to sensitive or important areas, or that it include a commitment to complete such an investigation before drilling begins. The Final EIS should also describe how impacts associated with oil and gas drilling and production will be monitored. It should also explain how mitigation can be modified if necessary to reduce unexpected impacts to the environment.

The treatment of leasing within state parks and recreation areas is somewhat ambiguous, but seems generally governed by the Surface Occupancy stipulations. In addition to imposing such a limitation, BLM should coordinate leasing and development activities with the Division of Parks and Outdoor Recreation. This is important to ensure that off-site drilling, production and support activities have minimum impact on recreation and natural features within the park as well as access to the park. Similar coordination should occur with respect to leasing and development adjacent to nominated and designated Natural Areas and research natural areas.

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Division of Parks
and Outdoor Recreation
Division of Land & Conservation
Division of Mines
and Geology
Division of Fish & Wildlife
Division of Forest Resources
Division of Water Resources
Division of Energy Resources
Division of Public Safety
Division of Health Services
Division of Labor Relations
Division of Social Services
Division of Transportation
Division of Veterans Affairs
Division of Wildlife Management
Division of Youth Services

Bob Kling, BLM
August 17, 1990
Page Two

Finally, the addition of an index would make information in the Final EIS more accessible to readers. Please contact me if you have questions or would like to discuss these comments further.

Sincerely yours,
Hamlet J. Barry III
HAMLET J. BARRY III
Executive Director

HJB:sh:1579
Attachments

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STATE OF COLORADO
BUREAU OF CONSERVATION
DIVISION OF WILDLIFE
AS PUBLIC INFORMATION SERVICE
P.O. Box 200, Denver, CO 80201
Phone: (303) 291-1122



MEMORANDUM

TO: Steve Norris
FROM: Don Smith
Date: August 6, 1990
RE: BLM Colorado Oil and Gas Leasing and Development Draft Environmental Statement and Draft Resource Management Plan Amendment

The Division of Wildlife has received the subject document and supports the Bureau of Land Management's proposed action alternative for their oil and gas leasing program in Colorado. Most of our concerns regarding wildlife have been incorporated into this document thanks to BLM's early efforts to coordinate with us and others.

In general, the DES provides good information on the three alternative actions, the affected environment and the impacts of the program. The glossary and the appendices were quite helpful in understanding more about BLM's oil and gas leasing program and its complexity. We believe, however, that the final report can be improved with (1) specific information on how each alternative affects each of the five resource areas, (2) a better explanation of alternative comparison, (3) explanation of the various tables, (4) a uniform description of the affected environment for each resource area (the GSA was very good), (5) specific information on the environmental consequences on wildlife for each resource area (not considered) and (6) additional explanation of the cumulative impacts and which resource areas would be affected the most. In addition, the titles of appendices K, L & M should be changed to T & E so that if additional information is not added and appendices should be added for existing environments of the Klamath and Northwest Resource Areas.

In addition to our general comments I am attaching specific comments which we feel would improve the environmental statement and plan amendment. We applaud BLM's effort to coordinate their oil and gas leasing program with their 90's and the programs of other agencies. Some problems will continue but hopefully they can be resolved in the future.

DS/gj/241DH

Attachment

cc McCloskey
Goodman
Regional Habitat Biologists

DEPARTMENT OF NATURAL RESOURCES, Hamlet J. Barry, Executive Director
WILDLIFE DIVISION, Brian R. Heister, Chairman • Denise Lutz, Vice Chairman • Brian H. Cohen, Secretary
Felix Crowl, Member • Robert L. Fray, Member • Louis F. Smith, Member • George MacDonell, Member • Larry M. Smith, Member

Comments on BLM Oil and Gas Leasing
Colorado Division of Wildlife

	Page	Col.	Para.	Remarks
11	1-5	1	4.	It would be desirable if the WGL between BLM and the COAGC included wildlife mitigation and other protective environmental agreements as well as mining agreements.
29	2-4	1	3.	The timing limitation stipulation does not always apply to maintenance activities, especially in emergency situations. Damage to wildlife habitat under these circumstances should be addressed and stipulations proposed for mitigating losses.
32	2-5	Table 2-3.		More discussion of Tables 2-3, 2-4, and 2-5 would help differentiate between the three alternatives.
33	2-8	1	1.	The comparison of alternatives should discuss other wildlife losses captures.
35	2-9	Table 2-6.		The impact of the second alternative, continuation of present management, or wildlife will be different from the proposed alternative and the table should reflect this. In addition, it would wild horses experience "losses" when wildlife are only "disturbed"?
81	3-6	1	1st.	Add more information about the semi-desert shrub community like those of other community types. It comprises 20 percent of the vegetation in the GSA and is important wildlife habitat.
102	3-6	2	1st.	The paragraph is poorly written with no lead in to the plant species. Classification is needed.
103	3-8	2	3.	A paragraph explaining the plant species in the GSA is needed to complement table 2-2. Are state listed plant species of special concern inventoried by the Resource Areas?
85	3-9	Table 3-3.		Vegetated communities listed here should be discussed in the narrative to highlight importance of each as is done for the other Resource Areas.
88	3-11	1	3.	The discussion on livestock grazing is inadequate and should be expanded to consider this use on the five Resource Areas. The impact of leasing on livestock use is significantly greater than that on elk, bison, and climate and air quality receives three pages of narrative.

Comments cont.
Page 2

	Page	Col.	Para.	Remarks
91	3-12	1	5.	More explanation of "critical habitat" is needed. How does this relate to COAGC's WGL definition of "critical habitat"? Similar concentration areas are very important but are not mentioned here.
100	3-26	2	4.	The discussion of big game animals should be expanded to highlight important habitat on BLM land.
99	3-26	2	5.	Other important bird species include bob white quail, turkey and pheasant.
122	3-28			The map should show the name of the Resource Area and be included on all maps of that Resource Area.
113	3-31	1	1.	Additional information on the spotted owl should be addressed in the DES. A former BLM biologist reported at least twelve locations of spotted owls in the SRA in the mid 1980's. In addition, the present COG activity at Cone Canyon may impact spotted owls in Cone Canyon.
124	3-39	1	4.	The wild and scenic river study for the Yampa River has been completed.
129	3-50	1	5.	New Raymer is disappaled.
175	4-3	1	1.	Disturbance to wildlife would not automatically be considered an indirect impact. Oil and gas activity can and does have a direct impact through disturbance especially during nesting and birthing seasons.
176	4-3	1	4.	All Resource Areas should have lease stipulations requiring the oil and gas lessee to compensate for the loss of critical habitat. A map of big game critical habitat in all Resource Areas would be helpful.
	4-6	1	2.	Rewrite (1) of the first sentence.
196	4-7	2	5.	In the first sentence "important" should be changed to "wildlife". This would avoid the confusion between important habitats and critical habitats mentioned in the last sentence.
161	4-12	2	1st.	It would be helpful to know the number of acres of forest land impacted by oil and gas development.

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DEPARTMENT OF HIGHWAYS

4801 East Arkansas Ave.
Denver, Colorado 80222
(303) 732-8851



July 24, 1990

Mr. Steve Morris
Department of Natural Resources
1311 Sherman, Room 718
Denver, Colorado 80203

Dear Mr. Morris:

The Colorado Department of Highways has completed its review of the Draft Environmental Impact Statement and Draft Resource Management Plan Amendment for the Colorado Oil and Gas Leasing and Development and has the following comments.

Page 4-17 of the document discusses the construction of access roads to the locations of oil and gas development. The Bureau of Land Management should be aware that access permits from the Department of Highways are required for any new access points onto state highways. This information should be included in the Final EIS.

Thank you for the opportunity to provide comments on this document.

Very truly yours,

Barbara L. S. Batzy

Barbara L. S. Batzy
Manager
Office of Environmental Review and Analysis

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NATURAL RESOURCES DIVISION

- | Page | Col. | Para. | Remarks |
|------|------|----------|---|
| 236 | 7-5 | 2. | The definition of mitigation should also include avoiding and compensating which today are considered essential to the mitigation process. |
| 237 | 7-7 | 2. | Did the State of Colorado have input to BLM's state list of sensitive species? Where is this document available? |
| 263 | 6-2 | 5. | The official title of Area Supervisors is now Area Wildlife Managers. |
| 264 | 6-3 | 1. last. | T&E animal species should also be included. |
| | 6-3 | 1. | Colorado now has a third rifle season. |
| 265 | 6-7 | 5. | Have raptor and sandhill crane nests been inventoried, and will there be an opportunity to include such information after an APO or other action is granted? Nest sites are dynamic and may require protection after-the-fact of issuance of the necessary permits. |
| 274 | 6-2 | 1. | A two-mile radius from the lek is necessary to protect grouse breeding habitat as explained on pages 3-24 and 4-4. |
| 273 | 6-2 | 1-6 | Please discuss your criteria for permanent abandonment of nests. |
| 272 | 6-2 | 2-6 | Usually a 1/2 mile radius from the nests of these raptor species is necessary for their protection. This distance should be consistent with that given on page 1-6. For T&E species, recovery plan guidelines should be conditions of the lease rather than BLM general stipulations. |
| 276 | 6-3 | 1. last. | COO's Garfield Creek State Wildlife Area should be covered under a no surface occupancy stipulation because of its importance as an ecological unit. |
| 279 | 6-4 | A2. | The radius for lek/hunting habitat for grouse should be 2 miles. |
| 280 | 6-2 | 64. | Bald eagle nesting activity in nearly year-round in some areas with resident birds. Special stipulations may be needed in those areas. |
| 284 | 6-9 | 182 | The controlled surface use stipulations outlined by the COO should be applied to all Resource Areas. |

STATE OF COLORADO 20

COLORADO DEPARTMENT OF HEALTH
4210 East 118th Avenue
Denver, Colorado 80231
Phone (303) 331-6131

MEMORANDUM



For the
Governor
Executive Director

TO: Steve Morris, Department of Natural Resources

FROM: George Gerstlitz, Air Pollution Control Division

DATE: June 4, 1990

SUBJECT: Colo. Oil and Gas Leasing DEIS and DRMP Amendment

Thank you for the opportunity to comment on this document.

A discussion of coal bed methane development is included in this EIS, yet the document makes no mention of the cumulative air quality impacts of an influx of numerous compressor engines and turbines associated with such development. As a result, the discussion of air quality in the Environmental Consequences section is inadequate. Furthermore, "very minor, local impacts" should be defined in light of the potential cumulative impacts of the proposed development.

If you have any questions, please call me at 331-8503.



Receiv USA

PO Box 200
Denver, CO 80201
800 275-5500
Denver, CO 80201

August 17, 1990

Draft Resource Management Plan Amendments
Draft Oil and Gas Leasing Environmental Impact Statement (EIS)
Glenwood Springs, Kremmling, Little Snake, Northwest
and San Juan/San Miguel Resource Areas

Mr. Robert Kline, Project Manager
Bureau of Land Management
U. S. Department of Interior
764 Horizon Drive
Grand Junction, CO 81501

Dear Mr. Kline:

Texas has reviewed the captioned draft plan amendments and oil and gas leasing EIS (DEIS) and we offer the following comments:

General Comments

We support the Colorado BLM's decision to amend the resource management plans in one document. This is an efficient use of your time and budget. However, we do have a number of general objections:

27 A township-range map should have been provided in the DEIS which would identify the exact location of oil and gas restrictions for each resource area. It was impossible to measure any direct impacts on Texas without matching restrictions to areas of moderate to high oil and gas potential. We suggest that you provide such a map with any future land use documentation.

148 The DEIS appears to be heavily weighted in favor of non-commodity uses such as wildlife habitat, cultural resources and recreation. Most of these areas have significant oil and gas potential yet there is a dramatic increase in no surface occupancy (NSO) stipulations. This will have a stifling impact on possible exploration and development of oil and gas resources. The BLM's Supplemental Program Guidance (SPG) for field minerals directs that areas with high potential for oil and gas resources should receive special attention in the planning process. This is also consistent with BLM's responsibility to manage public lands for multiple use.

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50 Cumulative impacts of oil and gas activity appear to be based on "worst case development scenarios" rather than a "reasonable foreseeability analysis" as is required by the National Environmental Policy Act (NEPA). By arbitrarily increasing the predictive level of development, you increase the level of impacts and, therefore, the level of need for "adequate" protection to surface resources. Also, the BLM should improve the final DES by presenting an accurate picture of effects which are reasonable to expect after stipulations have been applied under each of the alternatives presented. This should reduce the impacts of oil and gas development considerably.

46 The adequacy of NEPA analyses should not be based solely upon the number of wells that have been drilled in an area. You should also consider how many wells are producing, have been redefined and whether mitigation measures were employed. A distinction needs to be made between exploration and production wells since only a small percentage of exploration wells ever result in further development.

1 Although we commend your efforts to combine several plan amendments into one document, this should have been done in a more logical and coordinated fashion. The document includes a number of discrepancies and is very confusing. For example, on page 4-1 it is stated that wildcat wells would result in the loss of approximately 10 acres of vegetation per well or a total of 19,200 acres (from 1,920 wells) over a twenty year period. Yet on page 4-22 it is stated that as many as 1,753 wells could be drilled. Then on page 2-2, Table 2-1 indicates that the projected number of wells is 1,789. Significant clarification is needed in the final document.

146 Chapter 4 on Environmental Consequences exaggerates the potential effects of oil and gas activity on other resource values. Standard and special stipulations are designed to mitigate environmental consequences, yet this was never discussed. The manner in which environmental consequences are discussed only serves to inflame public sentiment against oil and gas activity. Examples are:

Seismic activities such as explosive charges or thumpers, etc. "could disrupt normal water flows, loss of water to existing springs and water wells."

effects from oil and gas activities would be most significant during critical seasons when the animals are already under substantial stress."

How often do these situations occur and are the alleged consequences documented by any credible study? Without evidence of negative impact, such conclusions should not be drawn.

Specific Comments

Texasco's recommendations that the BLM adopt the Standard Terms and Conditions Alternative. We are not convinced that NSO, seasonal or other special stipulations are necessary to protect the various resource values in the five resource units evaluated. Since it is unlikely that you will adopt this alternative, we recommend the Continuation of Present Management Alternative as a second preference. Their appears to be little difference in cumulative impact according to your study between this alternative and the Proposed Action Alternative, yet there is a 50% increase in NSO stipulations from the Current Management Alternative to the Proposed Action Alternative (from 162,533 acres to 569,902 acres). In terms of impact to Texasco we conclude the following:

- Without maps which illustrate exact locations of lease stipulations it was difficult to ascertain direct impacts to Texasco. However, with some assistance from your state office in Denver we were able to identify and overlap general restriction areas for the "Proposed Action Alternative" over areas which Texasco has interest in or considers to have significant oil & gas potential. We believe that there is moderate to high oil and gas potential in the Little Snake, Glenwood Springs and San Juan/Miguel Resource Areas. We have interest in leasing and/or drilling in these areas and we have producing wells in San Juan and Little Snake. Under the Proposed Action Alternative most of this area is encumbered with NSO stipulations. There is no guarantee that such stipulations would be waived at the time an APD is filed. Therefore, by increasing the risk factor, this restriction will act as a deterrent to Texasco's willingness to explore for and develop oil and gas resources.

61 In the Glenwood Springs Resource Area you would require operation through a special stipulation to compensate for the loss of crucial wildlife habitat. This stipulation exceeds mitigation measures required in the other four resource areas. It appears that the oil and gas industry is being singled out to pay for habitat improvements for which the BLM is responsible. Also, the level of stipulations discussed does not justify the need for such a stipulation. This represents increased cost to Texasco and would have a direct impact on our exploration and development decisions.

47 In the Little Snake Resource Area the BLM predicts that 350 wells will be drilled over the next 20 years based on historical data. Yet the BLM almost doubled its projections to 1000 wells, creating a "worst case scenario". This was done to avoid having to amend the planning document when the true threshold would be met. The problem is that such a projection increases the level of mitigation required to protect resource values. This in turn increases Texasco's cost of operation.

Conclusion

While Texasco commends the BLM for combining the resource area plan amendments in one document, we have a number of problems with the draft document:

- The Proposed Action Alternative which the BLM recommends for future land use management has dramatically and without justification increased NSO restrictions.
- BLM's discussion on environmental consequences of oil and gas activity is grossly exaggerated.
- The "worst case oil and gas development scenarios" should be replaced with "reasonable foreseeable analyses".
- Maps which identify oil and gas restrictions should be available so industry can adequately measure impact.
- Areas studied have significant oil and gas potential and this is largely ignored in the final outcome of the planning process. Other resource values such as wildlife habitats, cultural resources and recreation activities are given preferential treatment.

We strongly recommend that the final plan amendments be designed to encourage the exploration and development of oil and gas resources and that the BLM fulfill its responsibility to manage public lands for multiple use.

Texasco appreciates the opportunity to comment on this important document. We hope that our comments will be considered in formulating your final resource management plan amendments and environmental impact statement.

Sincerely,

Terrence M. Belton
Regulatory Affairs Coordinator
West Region Land Department

TMB/

ECB-MRC
JCH
RAY



August 16, 1990

Robert W. Wilms, Project Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, CO 81506

File: BCV-328-031

Colorado Oil and Gas Leasing and Development RIS

Amoco Production Company, a wholly owned subsidiary of Amoco Corporation, is incorporated for the purpose of exploring for and developing oil and gas resources. Amoco Production Company has a large leasehold position and operations within Colorado on federal lands which could be affected by this document. Therefore, we believe it is important to provide our perspective on the RIS for your consideration.

One important aspect of the document which we support is the BLM's decision to amend the various Resource Management Plans to conform with the Supplemental Program Guidance for fluid minerals. This approach will maximize the agency's time and budget resources for the future.

In reviewing the various appendices, several questions and concerns were identified. In an effort to better identify such concern, the appropriate appendix is referenced.

Appendix D

262 Cultural Resources: within this section there are numerous references to a "test" setback of sensitive activities from cultural resources. In reviewing the restriction, there appears to be no test or criteria provided in modifying this restriction. It is important to note that a variety of seismic alternatives are available that, depending on their application, may not pose a threat to a cultural resource. An example would be a shot-hole seismic program designed in such a manner that the explosive device would not possess enough energy to threaten a cultural resource from vibration. It is important that the process for allowing exceptions to this restriction be provided so that operators may be able to design a program that would protect the resource and still allow for data acquisition.

258 Explosives: the restriction that "loaded shotholes not be left unattended" is somewhat confusing. The reason is that there may be short intervals between when the shotholes are loaded and when it is detonated that the hole is unattended. Even when these situations exist, the risk to the public is very remote since the lead wires are usually placed below the ground surface until detonation occurs. Further, the charge could not be detonated even if the leads were exposed unless an electrical charge was used. Therefore, the need to apply such a restriction does not appear justified. It would be less cumbersome to eliminate this sentence considering the low risk factor and the nature of how shotholes are loaded and detonated.

E. Resources (other than oil and gas) - A paragraph states that water wells drilled to provide water will be offered to the BLM after use and that water rights will be held by the BLM. It is important that the statement be added that BLM will also assume all legal responsibility for the well after assuming ownership. This is an important aspect that must be documented for future records maintained by the State of Colorado.

261 H. Production: One requirement in this section states that rock surfacing will be required for all weather operations. This requirement is not necessary in all situations. For example, some areas of Colorado contain certain soils, combined with arid conditions, that would make rock surfacing an unneeded and unnecessary cost. It is important to note that traffic associated with production will constitute light traffic of a sporadic nature. The need for this condition should only be applied on a case-by-case basis considering weather, soil and traffic.

260 Another area of concern is the requirement that appropriate noise mitigation will be employed if the well is located within 2,500' of a residence. A half mile radius to employ this rule is excessive. There are a multitude of conditions that could affect noise on a given residence. Such factors as terrain, certain noise frequencies emanating from the equipment, and wind direction and velocity affect the degree noise would impact a given residence. By not considering the site specific conditions present for a given situation, operators could be forced to install noise mitigation measures which may not be needed once all

conditions and factors are analyzed. As a result, this mitigation should only be required in cases when the need can be clearly demonstrated. It is the recommendation that this qualifier be included as part of this condition of approval.

Appendix E

269 No Surface Occupancy stipulations: Two specific areas of concern exist with this section. One deals with the restriction regarding operator nests. The stipulation states that a 1/4 mile setback will be required for certain species of raptors. Exception criteria is listed which includes evidence of persistent abandonment. One criteria that is not mentioned is that some species develop multiple nests in a given area, but only utilize one nest in a given year. Therefore, instead of using the term "persistently abandoned" nests as an exception criteria, we request that the term "unoccupied" be given equal weight as a consideration to granting an exception to this stipulation.

277 Another area of concern deals with restrictions detailed in the Glenwood Springs Resource Area. Specifically, there are a number of special management areas where exception criteria to operate within the area is dependent upon "eliminating drill rig and other equipment noise" as well as "screening operations from scenic view shades". These stipulations are unrealistic and not justified for a number of reasons. For one reason, these special areas are typically not utilized the entire year, and as such, operations could be scheduled to avoid conflicts with high use periods. Secondly, drilling operations are a temporary intrusion. Consequently, this would reduce concerns from both a visual and noise perspective. Third, it is not possible to eliminate equipment noise from operations. However, the extent to which it could be heard would depend on a variety of factors, not the least is whether anyone using the areas could even hear noises emanating from the operations. This should be a valid consideration since technology exists to reduce noise to a degree where people in certain areas would probably not notice the operations. Fourth, those areas which prohibit traffic should not require the oil and gas operations to mitigate noise when the management of the area allows outside noise intrusions as a part of the immediate environment. Therefore,

taking into account these factors, it is recommended that the "elimination of noise" and "screening operations" requirement be deleted from the final EIS.

Anaco Production Company appreciates the opportunity to comment on the draft EIS. Thank you for considering our comments.

David R. Brown

David R. Brown
Environmental Affairs

008



Chevron U.S.A. Inc.

6400 Sixth Fidelity's Green Circle, Englewood, CO 80111, P.O. Box 586, Denver, CO 80201

Use Permit Waiver

State Analysis

Supplemental Regulatory Affairs

12001 100-1024

August 17, 1990

Oil and Gas Leasing Amendments
Colorado BLM
Resource Management Plans

Mr. Robert M. Kline, Project Manager
Bureau of Land Management
764 10th/20th Drive
Grand Junction, CO 81501

Dear Mr. Kline:

Chevron U.S.A. Inc. supports the Colorado BLM's decision to use the Glenwood Springs, Kremmling, Little Snake, Northwest and San Juan/San Miguel Resource Management Plans for the purpose of managing the oil and gas leasing requirements. We believe that combining all five amendments into one EIS is the most expeditious and prudent approach. We praise you for realizing the need to amend these plans, without causing a disruption to the oil and gas leasing program.

14 However, we do have some serious concerns about your draft EIS. First, the acreage figures throughout the document do not agree. There are many discrepancies between the acreage figures are present. For example, on page 4-1 it is stated that wildcat wells would result in the loss of approximately 10 acres of vegetation per well, or a total of 19,000 acres (indicating 1,900 wells), over a twenty year period. However on page 4-22 it is stated that as many as 1,753 wells could be drilled. On page 2-5, the number of wildcat wells in Table 2-1 adds up to 1,789; and the figures in Appendix B (except for the Little Snake Resource Area) do not match any of the above figures. Which numbers are correct?

18 Second, we believe the document would be easier to understand if, for the proposed action, you would summarize in one place all of the major changes that are proposed in the five RMP's.

17 Third, for all of the proposed changes to the RMP's, you need to justify why such changes are necessary or desirable. This was not done, leaving you vulnerable to a legal challenge.

50 Fourth, we strongly object to the use of worst case development scenarios when projecting future production. Furthermore, the Council on Environmental Quality condemns this approach as well. A reasonably foreseeable development scenario should be based on historical trends. For example, based on historical data, the BLM predicts that 550 wells will be drilled in the Little Snake Resource Area over the next 20 years. However, the BLM doubled its projections to 1000 wells. This approach greatly exaggerates the anticipated impacts from oil and gas

August 17, 1990

activities, which in turn is used as justification for more restrictive, yet unnecessary, stipulations. To grossly overstate such historical trend figures only serves to distort what is reasonably anticipated and to overcompensate for impacts that very likely will never occur.

- 147 Our fifth concern relates to Chapter 4, "Environmental Consequences". This chapter exaggerates and misrepresents the impacts from oil and gas activities because it does not discuss the requirements and protections provided through the use of standard and special lease stipulations. These stipulations significantly reduce or eliminate virtually all of the impacts identified. Without a discussion of these stipulations, the public will be seriously misinformed about the BLM's role in managing oil and gas activities. The BLM should limit its discussion to potential effects which could occur with the lease stipulations in effect for each alternative.

Sixth, we are strongly opposed to the Glenwood Springs Resource Area's proposed stipulation which would require oil and gas leases to compensate for the loss of crucial habitat, either on-site or off-site. This stipulation is unreasonable because of the small amount of acreage involved in oil and gas activities, combined with the temporary nature of such activities. Furthermore, the oil and gas industry should not be singled out from all other resource area users to pay for habitat improvements. We know from the frequent presence of wildlife on our roads and wellsites that our operations have a minimal negative impact, and sometimes even a positive impact, on wildlife. Can the same be said of other resource area users?

We question the BLM's justification for the proposed use of this stipulation: the reduction in big game winter ranges as the result of industry's activities. The level of oil and gas activity predicted by the BLM does not support the claim that ungulates would be forced to compete for winter range due to oil and gas operations. If there is competition for winter range, it would be more likely to result from overpopulation which should then be worked out between the Colorado Division of Wildlife and the BLM.

- 69 Another serious concern with this proposed stipulation is its vague wording--how are "adverse impacts" going to be defined and predicted in advance? Such vague wording will very likely lead to confusion and the unwarranted use of this stipulation.

We are also convinced that this stipulation is not justified. The Glenwood Springs Resource Area (GSRA) predicts that with an average of 2.7 wells drilled per year there would be approximately 78.8 acres disturbed annually (which seems awfully high). According to Chapter 3, the GSRA estimates that 200,000 acres of mule deer winter range are crucial habitat, and 150,000 acres of elk winter range are considered crucial. No other species were identified as having its crucial winter range possibly impacted by oil and gas activities. Can the GSRA truly believe that an annual surface disturbance of 78.8 acres would have more of a minimal impact on the 200,000 acres of crucial habitat for these two species? Its objectivity and credibility would be seriously jeopardized if it insisted on

the same. This stipulation is patently unreasonable and unnecessary, and should be deleted.

- 57 Seventh, we are disturbed by the GSRA's overwhelming increase in the use of the No Surface Occupancy stipulation--from 45,066 acres to 365,412 acres--in BLM acreage. Less than half the GSRA would be available for lease with surface occupancy, and of those acres available, they would all apparently contain a controlled surface use stipulation as well as a timing limitation stipulation. The GSRA appears to be trying to restrict activity on all of the BLM's free resource area, without any justification whatsoever. This approach amounts to a de facto withdrawal of land, and is unacceptable.

- 27 Our eighth concern is the lack of resource area maps which would show what stipulations would be applicable by alternative--we believe this information must be included in the final EIS in order to satisfy site specificity requirements.

- 28 Ninth, we believe the discussion of mitigation measures that will be used under all the alternatives, on page 2-3, uses an inflammatory and unrealistic example by discussing the terrible effects of oil and gas activities on elk if the BLM does not manage the situation. Since the BLM does control and monitor our activities, this discussion is unrealistic, serves no purpose, and should be deleted.

- 250 Tenth, the figures throughout Appendix B need to be reexamined. It is inconsistent and confusing. Furthermore, the maps and data provided by each resource area should be standardized so they are all on the same scale, and are using the same definition of high, medium, low and unknown potential.

- 285 Eleventh, in Appendix F, page F-1, it is stated that one of the conditions of approval for the GSRA and Little Snake Resource Area in fragile soil areas is: "Before reserve pits, production pits, or emergency pits can be reclaimed, all residue will be removed and trucks will be off-site to an approved disposal site." Other alternatives must be considered. Since drilling mud is not toxic and is exempt from the Resource Conservation and Recovery Act, we do not believe it is reasonable to have such a strict requirement in these two resource areas. For example, Chevron quays often will solidify the solids with cement after the liquids are hauled off, which is a far less commonly-used alternative.

We hope these comments have been constructive and will aid you in making necessary changes to your draft. Thank you for your consideration of our comments.

Sincerely,

 Lisa Herter

cc: Mr. Frank Silverwicz
 BLM Deputy State Director,
 Mineral Resources



UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE SERVICE
 750 Shaw Street, Suite 205
 Golden, CO 80401
 (303) 779-2875
 (303) 779-2875

IN REPLY REFER TO:

PER/OB/BLM/CO 011 & Gas Leasing
 Mail Stop 65412 Grand Junction

August 21, 1990

Memorandum

To: Team Leader, Combined O11 and Gas Plan Amendment/EIS, Bureau of Land Management, Grand Junction, Colorado

From: Colorado State Supervisor, Fish and Wildlife Enhancement, Fish and Wildlife Service, Golden, Colorado

Subject: Comments on Colorado O11 and Gas Leasing Draft EIS

- 112 We offer the following comments on your Combined O11 and Gas Plan Amendment/EIS which covers the Glenwood Springs, Kremmling, Little Snake, Northwest, and San Juan/Miguel Resource Areas. First, we have published a new candidate plant list February 21, 1990, in the Federal Register (55 FR 6184). Since we sent you a previous species list on this project on June 16, 1989, we are therefore sending you an updated plant candidate list.

Common Name	Scientific Name
Glenwood Springs	
Waterhole milkvetch	<i>Astragalus ustherlii</i>
Parachute beardtongue	<i>Pentstemon debilis</i>
Harrington beardtongue	<i>Pentstemon harringtonii</i>
Debeaux phacelia	<i>Phacelia subspicata</i>
Kremmling	
Harrington beardtongue	<i>Pentstemon harringtonii</i>
Little Snake	
Waterhole milkvetch	<i>Astragalus ustherlii</i>
Waterhole milkvetch	<i>Astragalus ustherlii</i>
Debeaux phacelia	<i>Phacelia subspicata</i>
Sibbalds beardtongue	<i>Pentstemon sibbaldii</i>

24

Page 2

24

Common Name	Scientific Name
Northwest	
none	
San Juan/San Miguel	
Mancos columbine	<i>Anemone cylindrica</i>
Franquist milkvetch	<i>Astragalus franquistii</i>
Schmidt milkvetch	<i>Astragalus schmidtii</i>
Mesa Verde stickseed	<i>Isotria medeolae</i>
Mesa stickseed	<i>Isotria medeolae</i>
Frosty bladderpod	<i>Lesquerella purpurea</i>

Also, Osterhout milkvetch (*Astragalus osterhoutii*) and Penland beardtongue (*Pentstemon penlandii*) are federally listed as endangered, whereas they appear on Table 3-4 on page 3-4 as federally threatened.

- No Surface Occupancy stipulations (NSO) are listed in your Appendix E for various resource values in the different resource areas including candidate, threatened, and endangered species. With a forty-acre minimum, NSOs are most effective for protecting large populations of high concentration. In this regard, we recommend NSOs for the Osterhout milkvetch and Penland beardtongue in the Kremmling Resource Area, and the Gibson beardtongue in the Little Snake Resource Area. Maps showing the recommended NSOs are attached. These species have been adequately surveyed and known populations of high concentration delineated.

- 111 Additionally, the June 16, 1989, memorandum discussed the importance of the Section 7 process anywhere in the EIS. This should be corrected.

- The Fish and Wildlife Service, with the cooperation of the BLM and Colorado Division of Wildlife, is currently evaluating black-footed ferret reintroduction sites in Colorado. At the present time, this is ongoing in the Little Snake and White River Resource Areas. Eventually, all BLM resource areas in Colorado will receive similar consideration. We therefore recommend changes to the EIS to recognize the implications the ferret reintroduction process may have on the management of prairie dogs on BLM lands.

The Fish and Wildlife Service is preparing guidelines for oil and gas activities in black-footed ferret recovery areas. A copy of the draft guidelines has been provided to Mr. Lee Upman and Mr. Bob Kline. The draft

EIS should incorporate reference to these guidelines where appropriate with a commitment to adopt specific mitigation techniques where necessary.

The Fish and Wildlife Service believes that major causes for the decline of the Colorado squawfish, humpback chub, bonytail chub, and the recently proposed razorback sucker, include the effect of impoundments and water depletion from the Colorado River and its tributaries such as the San Juan. Since oil and gas drilling has increased the depletion of water, we believe that any future oil and gas lease made possible by the year 2000 Oil and Gas Leasing EIS that causes a depletion of water from the upper Colorado River basin should prompt a "may effect" finding for the listed and proposed fishes and necessitate consultation and conferencing under the Endangered species Act.

192 { As we have previously discussed, the most efficient way to handle the many small depletions from individual wells would be to make an estimate of total depletion for the four resource areas in the upper Colorado River basin covered in the IIS. This estimate could be based on the Assumptions for the Potential of Development already presented in Appendix B.

This way the impacts to the endangered Colorado River fishes could be covered by one biological assessment and one biological opinion at the leasing stage, rather than many such documents for every oil and gas well authorized through the subsequent Application for Permit to Drill process.

Specific Comments

FMS Memo of 5/16/89

34 Page 2-9: Based on this table only, there appears to be only minor differences between the three plans. It is not clear what advantage the proposed amendment has to resource protection or the administration of oil and gas leasing.

104 Page 3-21: Threatened and endangered species. This section should receive consistent treatment for each planning area. For example, there should be a table for each resource area, similar to Table 3-90 prepared for the Northeast Planning Area. Each planning area should include those lists of species provided by the FWS to the BLM on June 16, 1989. The razorback sucker was proposed for Federal listing on May 22, 1990, and is therefore no longer a candidate species.

Page 3-26, left-hand column: The process of identifying potential black-footed ferret reintroduction sites will occur throughout all of Colorado. Consequently, we believe this paragraph should recognize that evaluation of candidate sites will eventually occur in all of the planning areas discussed in the IIS, not only northwest Colorado. Prairie dog abundance may be more than adequate to support black-footed ferrets in many other Resource areas.

Page 4-1, right-hand column: This paragraph should recognize that informal and/or formal consultation may be required under Section 7 of the

Endangered Species Act. This consultation may in some cases be appropriate at the learning rather than the operational stage.

Page 4-5, right-hand column: What is "...the protection for TSE species." We believe it is premature to say that significant impacts to threatened and endangered species will not occur. Based on current inventories, there are 62,000 acres in the project in the list of threatened resource areas. We are not aware of similar inventories in the other resource areas but suspect significant prairie dog work in the San Juan/San Miguel Plateau area. We believe we will need to develop a plan that would recognize the guidelines for G and GAS activities in Prairie Dog Ecosystems Managed for Black-footed Ferret Recovery being prepared by the BLM. This plan is not complete. It is not clear how the application of appropriate mitigation listed in Appendix D will produce significant impacts. The key language in Appendix D, page D-7, appears to be "...and the degree that existing threatened and endangered rights are not unduly hindered or precluded."

Page 4-24, left-hand column: It is true that threatened and endangered species are covered by laws and regulations. However, it is possible for significant impacts to result from some activities. For example, while Section 7 of the Endangered Species Act requires a consultation process, impacts below the jeopardy-causing threshold may occur. We believe it is inappropriate to imply that the existence of laws will prevent significant impacts.

Page 8-2: According to this table, the Little Snake Resource Area could realize the greatest surface disturbance of all the planning areas evaluated. Development in prairie dog towns prior to their evaluation for black-footed ferret recovery could compromise potential reintroduction proposals.

Page E-1, left-hand column: It is unclear what minor inventories or short-term special studies include. We can imagine a lessee arguing against mapping prairie dog towns and/or completing black-footed ferret searches.

Page 0-7: Threatened and endangered species. We believe this section should restate the possibility of the consultation that could be required under section 7 of the ESA, and the guidelines for oil and gas activities in ferret recovery areas be prepared by the FMS.

Page E-2: No surface occupancy. Until black-footed ferret recovery potential has been evaluated in each planning area, and reintroduction decision documents are in place, we believe all prairie dog towns in each planning area should be designated NSO. According to the peregrine falcon recovery plan, the Rocky Mountain Southwest Populations, recovery task number 1221 asks that permanent disturbances be prohibited within 1 mile of falcon nesting cliffs. We believe the NSO stipulation should adopt this recommendation.

271

Page 5

286 Appendix L: A threatened and endangered species animal list needs to be added here. There should be a similar appendix for the Krenmling and Northeast Planning areas.

If the Service can be of further assistance, please contact John Anderson (plants) or Bob Leachman (animals) of the Grand Junction office at (303) 243-2778 or FTS 322-0351.

Rich. L. Rose

attachments

cc: FNS/FWE, Salt Lake City
FNS/FWE, Grand Junction

WEMINUCHE GROUP
Sierra Club
P.O. Box 1696
Durango, CO 81301



August 15, 1990

Robert W. Kline
Bureau of Land Management
764 Horizon Drive
Grand Junction, Co. 81506

Dear Mr. Kline:

After reviewing and discussing the recently released Draft EIS titled "Colorado Oil and Gas Leasing" our group has the following comments:

13 { The high amount of acreage open to leasing for oil and gas development shows an unbalanced management plan. Favoring the demands of oil and gas companies over other land users is apparent.

70 No Surface Occupancy stipulations are cited as the method for protecting crucial wildlife areas and vegetation. It is our understanding that these stipulations are frequently waived at the request of developers and consequently offer little real protection. If an area is to be truly protected it should not be leased. NGO stipulations should not be waived.

Impacts to wildlife from roads, legal and illegal human activity, noise and disturbance of habitat would be many. We would like to see specifics for maintaining habitat at the time of the oil and gas activity, not "within a few years"(p4-4 describing the time it takes to reclaim disturbed areas).

197 { The statement (p4-8) "Some long term loss and irreversible and irretrievable commitments of wildlife resources would occur, but no significant losses in wildlife populations or habitat would be expected" is open to question. How much is "significant?"

Degradation of water quality is another issue that concerns us. The problems created by oil and gas development along the Colorado/New Mexico state line are well known. Migration of methane into adjacent water sources is a very real threat as is the depletion of overlying aquifers. We believe that it is likely to occur and would have a significant effect on water quality.

We appreciate this opportunity to comment and request that we be kept informed of further developments on oil and gas leasing.

of BLM lands in Colorado.

Sincerely,

Patricia L. Schuler
Patricia L. Schuler
Conservation Chair

August 10, 1990

Mr. Bob Moore
State Director
Bureau of Land Management
Colorado State Office
2890 Yonahfield Street
Lakeview, Colorado 80215-7076

Dear Mr. Moore:

We would once more like to reiterate our opinions concerning the actions being taken in accordance with the Colorado Oil and Gas Leasing Environmental Impact Statement dated April 1990.

When the Little Snake RFP was in its draft stages, the NV Colorado Ranchers Association protested priority management areas where there were federal minerals with fee surface. To our knowledge, changes were made so that no restrictions would be placed on fee surface, resulting in the elimination of priority management areas. Our conclusion was that whenever any planning was to be made concerning federal minerals covered by fee surface that those land owners would be consulted for their input.

We are extremely anxious due to restrictions being placed on exploration, drilling and development activities during the time that wildlife are having their young, yet there are no similar stipulations to protect critical leading and calving grounds for the same restrictions. (Reference June 1989 Record of Decision, Page 12 Table 4). In all fairness to those affected, if restrictions are to be placed on oil and gas exploration for wildlife concerns similar restrictions should also be placed upon exploration, drilling and development activities for livestock purposes.

During the period from March 15 through June 30 the livestock industry is engaged in both its leading and calving seasons. It is an exceptionally crucial stage for our business. Abnormal human or vehicular activities during this time period create immediate stresses on the livestock, which in turn will impede the crucial bonding between a mother and her offspring. If this bonding stage is hampered or impeded, a loss of lambs and calves will occur, a loss which can be detrimental to our industry.

United States
Department of
Agriculture

Forest
Service

Rocky
Mountain
Region

1177 N. 8th Avenue
Lakeview, CO 80225-0127

Reply for 2520

Date: August 27, 1990

Mr. Bob Moore
August 10, 1990
Page Two

There has been a precedent set as to restricting Oil and Gas activities during this critical period of time for the livestock industry. We would like to see these restrictions utilized further. We once again stress that we are very willing to work with the Bureau of Land Management in resolving this issue and would hope that we would not have to bring up the question of rescue or litigation in order to have our concerns incorporated into the Oil & Gas EIS.

Sincerely,

RAFTOPOULOS BROTHERS

Love Refund

cc: Bill Pulford, Craig District Manager
Dan Seibert, Little Snake Resource Area Manager

Mr. Robert W. Kilne
Project Manager
Bureau of Land Management
764 Horton Drive
Grand Junction CO 81506

Dear Mr. Kilne:

The opportunity to comment on your Draft EIS and RMP Amendment for oil and gas leasing in Colorado is appreciated. Our office is currently developing a process for issuing decisions in Region 2, and the legal, procedural, and environmental questions to be resolved in both our records are relevant.

Because we are analyzing our records of this time, our records will be "in the future" to be part of the process. Our agency has said, "Our office will be part of the process" in "the future" to be part of the process of the future of the management of specific lands.

The following comments are offered:

1. Our comments will be "in the future" to be part of the process. Our agency has said, "Our office will be part of the process" in "the future" to be part of the process of the future of the management of specific lands.
2. Page 2-2 - The RMP was apparently developed from a "worst case scenario". Is this statement a problem legally?
3. Page 2-2 - What happens if the RMP is exceeded during the planning period of 20 years? Is there a threshold amount that allows for an additional percentage of the projected disturbance before an additional NEPA analysis is required?
4. Page 3-6 - Is there any old growth timber that could become so scarce?
5. Page 3-1 - The "officers" type and lack of maps is somewhat confusing.
6. Page 3-48 - One of the "officers" type and lack of maps is somewhat confusing.

27



P.O. Box 88
Craig, Colorado 81606
303-524-0242

28

September 18, 1980

Mr. Robert W. Kline, Project Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, Colorado 81506

Dear Mr. Kline:

21. Comments of Colorado Oil and Gas Leasing Draft: Environmental Impact Statement (EIS)

Cyprus Empire Corporation (CEC) does not believe that the above referenced EIS recognizes the significance of the potential conflicts between oil and gas development and the development of other mineral resources (particularly coal). Many coal resources can only be economically developed with the use of large-scale mining techniques. The economics of coal mining and particularly large-scale mining are dependent upon large continuous uninterrupted blocks of coal. Even one or two wells could sterilize an entire area from economic recovery. Coal mines (again particularly large-scale mining) require large capital investments, long term commitment and large reserves in order to obtain a return on their investment. Therefore, just because there is no current mining in an immediate area does not mean there will not be significant future conflicts. Furthermore, fracturing and other oil and gas development techniques could destroy roof and floor conditions, etc., causing permanent loss of coal resources even after oil and gas has been removed and wells are abandoned.

As a result, CEC recommends that the EIS be modified to require BLM to notify by certified mail all other mineral owners, leasees or parties which have expressed interest in other minerals on or directly adjacent to proposed oil and gas leases before issuance of any oil and gas leases or permits to drill.

We appreciate your consideration of this recommendation. Please feel free to contact us if additional details are needed.

Sincerely,

Ronald W. Stucki

Ronald W. Stucki
Vice President/General Manager

RG:dy

cc: Glen Dietrich (BLM Area Manager 189A)
Jin Dodd
Rick Mills
Norell Johnson

203 { 7. Page 4-26 - Although the cumulative effects of wildcat wells are generally insignificant, do field developments have effects that may be significant in some areas, for example, visual or wildlife habitat? If the fields are only a few wells, the effect would be small. However, a large field of 50 wells could be significant.

208 { 8. Are there any plans for monitoring sediment loads, wildlife populations, etc., to determine the effects of oil and gas activities?

239 { 9. Appendix A - This section appears to be generalized oil and gas operations and could be confused with the proposed action alternative.

249 { 10. Appendix B - Some of the data and maps are difficult to understand. Are they needed for the document?

270 { 11. Appendix E - How are overlapping stipulations managed? Presumably, the most restrictive stipulation will be applied. The possibility and desirability of standardized issues between the BLM and FS to eliminate inconsistencies across boundaries has been discussed. The Bureau ELP stipulations appear to be a good start, and we should pursue this opportunity in the near future.

Hopefully these comments will be useful in writing your final document. We will utilize some of your ideas in defending our process. We should strive to minimize the inconsistencies in the oil and gas surface management. If we do, the interested parties will be able to put them out to us.

If you have questions regarding the above comments, please contact Eld P. Hittig or Ken Schmitt at this office.

Sincerely,

Eld P. Hittig
Eld P. Hittig
Director, Watersheds, Soils, and
Minerals Area Management

EP:dy

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(August 1983)

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